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ORIGINAL ARTICLES

THREE COMMON CAUSES OF MATERNAL MORTALITY*

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IN 1924 the report on the vital statistics of Massachusetts shows that 544 women died under what is classified according to the International List of Causes of Death "The Puerperal State." In other words, that number of women died from causes relating to childbirth. This gives a mortality rate for this group of .5%. You will at once say that it is a low rate—why worry or talk about it? But if many of these deaths are preventable by better medical care, is it not worth while to study the chief common causes and see wherein we can improve this rate, how we can cut down this terrible economic loss, to say nothing of the homes broken up and the mental suffering that goes with each one of these deaths? I think it is, and I further think that in the improvement of obstetric practice today lies the greatest opportunity for the medical profession to lead in the great public health movement which is so strong now throughout the country.

A glance at the chart shows at once the two chief causes of maternal deaths—first, puerperal septicemia, and second, puerperal albuminuria and convulsions. It does not, however, show so clearly the third common cause about which I want to speak to you—that is, the bleeding cases, for these deaths may be grouped in any one of four subdivisions of "The Puerperal State," and unless we have a minute analysis of these deaths this cause is not clear.

Let me go over the bleeding cases first and call your attention to some of the reasons for a high death rate. The first reason is that any bleeding by vagina in a pregnant woman is not regarded as seriously as it should be. Bleeding by vagina is abnormal and the cause must be sought. That means the patient must be examined. Preferably this examination should take place in a hospital, but if this is not possible then preparations must be at hand to meet a severe hemorrhage that may follow closely in the wake of an examination. Of what does this examination consist? First you must quickly decide whether or not there is a question of an abdominal delivery. If there is, make no vaginals. A rectal examination will almost always tell you what you need to know and the danger of subsequent sepsis is much diminished. How do you decide whether or not to make a vaginal? First by the period of the pregnancy, and second by the feel of the abdomen. The nearer term the patient is, the greater the probability of a Caesarean being advisable. If the abdomen is hard, boardlike and tender, an abdominal delivery is more than likely. If you do decide to make a vaginal, your aseptic technique must be excellent, your own hands gloved and the patient shaved and prepared. The first is generally done, but the preparation of the patient is all too seldom properly carried out. A vaginal speculum is inserted and the source of the bleeding is looked for. Remember it may be a ruptured varicosity in the vagina, and inspection alone will find it. The cervix may be the cause, or the inspection may fail to show any bleeding. The speculum is then removed and the four culs-de-sac are carefully palpated, avoiding the cervix. If the presenting part is felt at once you know the dreaded praevia is not there, but if you get the characteristic boggy, full sensation, you know with what you have to deal.

If a praevia is diagnosed you can not afford to wait—the risk is too great. You must make up your mind at once how you are going to empty the uterus. Don't dilate manually and deliver. Either insert a large sized Voorhees bag or do a careful Braxton Hicks version. A Caesarean is unquestionably justified in some praevias, but it is not always the operation of election. To be done the patient must be in good condition, uninfected, preferably with no vaginal examinations, and the baby must be alive and also in good condition. If, however, the bleeding is due to a separated placenta, Caesarean section I believe is the operation of choice, even if the baby is dead. The only time I deliver such cases from below is when the os is practically fully dilated or very soft and dilatable, for the risk of dilating and delivering these patients from below is too great to assume,—much greater, I think, than in delivering a praevia by vagina.

The point I want to make is this. Investigate every bleeding case at once. Don't ever

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say to a patient, "If you bleed again, or any more, let me know." A bleeding case, no matter how slight, is a potential source of trouble and we must be prepared at all times to meet a grave emergency in such cases if we are to improve our death rate from this cause. The question of transfusion is always present in any bleeding case, and for that reason whenever a patient bleeds a suitable donor should at once be found.

A death from postpartum bleeding is usually due to some error in judgment or technique of the delivery. Either a patient has been allowed to go on in labor too long or a bungling operation has been performed through an incompletely dilated os, giving rise on the one hand to a hemorrhage from a tired out uterus, or on the other hand, to a hemorrhage of traumatic origin. A potent cause of postpartum bleeding is the bad management of the third stage of labor. Too many physicians feel that as soon as the baby is delivered all danger is over, and they rush the third stage for a quick get-away, only to be called back to find the patient *in extremis*. Following the delivery of the baby is the only time I use pituitrin, for by it I am confident that the danger of a postpartum hemorrhage is greatly lessened and the third stage is materially shortened.

Perhaps a review of one or two cases that I have had recently will explain what I mean in regard to these bleeding cases. A patient was at full term, and the doctor told me that she had started bleeding twelve hours before I saw her. She had passed many clots and was bleeding quite profusely. Palpation of the abdomen showed a soft uterus, no contractions present, no pain, baby lying in a transverse position and of good size. Rectal examination showed in the left uterine segment a boggy mass. I felt unquestionably that she had a placenta praevia, and as the baby was in good shape and the patient had not been examined and was a primigravida, I advised a Caesarean at once. It was accepted and we did a Caesarean, obtaining a live baby. The patient bled profusely after the removal of the placenta, but went off the table in fair condition, pulse about 120. Later in the afternoon she was reported as being in good condition, pulse staying around 120, with no excessive bleeding. I saw her in the early evening and found her pulse rapid, 140, scarcely countable at the wrist. She had been bleeding more than was appreciated. We at once transfused her with 500 c.c. of blood by the citrate method. Some three hours later, although the first transfusion made her feel better, but did not bring the blood pressure up or the pulse rate down, we transfused her a second time. Following this transfusion she improved rapidly and from then on made a steady and good convalescence. On obtaining the further history of this patient I discovered that she had started bleeding two months before I saw her,—that is, when she was in her seventh month she had her first show of blood. It was not investigated, and in no way studied. It stopped after a few days and three weeks later she had another period of flowing, not quite so profuse as the first. Three weeks after that she had another show which was as profuse as the first, and following that last show she had a slight amount of bleeding off and on until she had the sudden sharp hemorrhage the night before I saw her. This is the sort of management of a bleeding case which I criticize. Although we got out of that case satisfactorily with a live baby and a live mother, it was only by good luck, and not by good obstetrics. As soon as I was asked to see this bleeding case, I requested that the husband of the patient be at the hospital so that we could group his blood at once. Fortunately, on matching his blood with that of his wife, it was found to be compatible and we were able to use him. We were also fortunate in having as a second donor her brother, who also was compatible.

In explanation of another type of bleeding, one that comes in a separated placenta, let me tell you of this case. A doctor called me a little while ago and said that earlier in the day he had seen a patient who was bleeding, had had some abdominal pain, and was about full term, but that when he telephoned she was not bleeding, although the pain was continuing. He volunteered the information that there was no hurry and he didn't know that there was any need of anybody seeing her at the present time. From the history of sudden pain in the abmen, with some show, of course she had to be seen at once. I was unable to go out, but Dr. Bristol went immediately. Palpation of the abdomen showed that the uterus was hard and exquisitely tender. No fetal heart was heard and a rectal examination showed the presenting part could be reached, but no praevia was felt and no dilatation of the os was made out. Dr. Bristol made the diagnosis of a separated placenta and advised a Caesarean at once, much to the surprise of the physician, for he had in no way thought that the patient was seriously sick. She was at once removed to a hospital, a Caesarean done, and a dead baby was removed. The uterus contained many clots and the placenta was absolutely free within the uterus. This patient did not have to be transfused, and she made a perfectly satisfactory convalescence. She had been examined by vagina, and although we do not like to do Caesareans following vaginal examinations, Dr. Bristol felt that the risk of a Caesarean was less than the risk of a manual dilatation and delivery from below. He therefore elected a Caesarean and his judgment proved right.

A third case is as follows: A patient was about seven months pregnant, when she had a sudden sharp flow and she was immediately sent to a hospital where I saw her. Preparations were at once made to put a bag into the cervix

if we should find on examination that a placenta praevia was present, but after everything was ready and the patient had been carefully prepared, a bivalve speculum was inserted and the vagina was carefully inspected, and on the left pelvic wall was found a varicosity that was bleeding profusely. A suture was placed around it, the bleeding stopped, and the patient was put back to bed and in a few days was allowed to be up again. She went to full term and had a normal delivery.

A fourth case that shows the tragedy of bleeding is as follows: A physician was called to see a patient who had miscarried. She was about four months pregnant and the fetus and placenta had been thrown away before he got there. As she was still bleeding profusely he took her to a hospital, curetted the uterus, and packed it. She went through the night fairly well, but the next morning she appeared desperately sick and I saw her with him. There is no need of going into the details of her physical examination. It is sufficient to say that her pulse was scarcely made out, she was very pale, and breathing very rapidly. Abdominal examination was essentially negative. It was obvious that she had bled a great deal, although she was not now bleeding, and the thing to do was to transfuse her at once. She had had a criminal abortion done. We immediately started to transfuse her, but we had to send for the transfusion apparatus and as the only person available, the man who was responsible for her condition, was incompatible, we also sent immediately for a professional donor. Before we could get him to the hospital the patient died.

These cases I think make clear to you what I mean in regard to the management of bleeding cases in order to obtain better results. It must be remembered that a bleeding case is serious at all times, until you have proved conclusively that the bleeding may be disregarded. The more distant the patient is from her physician, the more certain am I that a complete investigation must be made at the first sign of bleeding. If a patient is in a hospital and the first bleeding stops, then we can afford to wait a little while before we investigate the cause, but it must be investigated before she is allowed up around her room or before she is allowed to go home. Always be ready to meet the possible hemorrhage that may take place. Be careful about putting your finger through the cervix. Very seldom is it necessary in order to make a diagnosis, and if you do put it through, beware of the hemorrhage that may occur. More than one physician has forced his finger through the cervix to come onto a complete praevia, causing a terrific hemorrhage, and has thought it necessary to dilate the cervix and deliver because of this hemorrhage, with most untoward results. Remember that with bleeding cases, if you possibly can, you must operate when the patients are in good condition, do the operation of election and not be driven to do something which you do not want to do. Of course, we all realize that every once in a while a patient will have one tremendous hemorrhage and die, but those cases are relatively rare.

If you see a patient who is bleeding very severely and you have not sufficient help, the one thing to do in the emergency is to pack that cervix and vagina tightly with sterile gauze. Don't put in a little strip, if you determine that packing is necessary, but pack tightly the entire vagina. Otherwise it will do no good.

The deaths from puerperal septicemia last year in Massachusetts amounted to 161 cases. There is no question that that number of patients died from puerperal sepsis, for no man will sign a death certificate "puerperal septicemia" if there is any possible way out of it. When a physician has a death from puerperal sepsis it is up to him to prove conclusively that he carried out a satisfactory surgical technique in the delivery. I would not say for one instant that the physicians of Massachusetts were entirely responsible for all of these deaths, but I do say it is up to the men who had those deaths to explain if they can why these women died.

It is fair to say from our knowledge of puerperal septicemia that by far the majority of cases become infected from the outside—that is, there is an error in technique somewhere. If we know that practically all cases with good surgical technique can be delivered successfully without sepsis, isn't it up to the medical profession to see why we continue to have these deaths? The delivery of a patient is a surgical procedure. We know that sepsis practically always is a wound infection. Something is carried into the vagina with a resulting infection. This means that in order to prevent these deaths we must carry out deliveries according to a well recognized surgical standard. A satisfactory preparation of the patient is essential, and yet relatively few patients have this preparation carried out.

What is a satisfactory preparation? First, the patient must be shaved. Second, the lower bowel must be emptied. Third, the vulva and surrounding area must be sterilized. Whether this sterilization is accomplished by a soap and water scrub or by ether and iodine is immaterial. On the whole, the ether and iodine preparation, or picric acid or even mercurochrome, is better when the outlet is markedly relaxed, for unless the soap and water scrub is carefully done, much of the dirty wash water gets into the vagina and is a possible source of infection. I have given up practically entirely the soap and water scrub for this reason, and use almost entirely the iodine or picric acid.

As important as is the preparation, more important is the question of vaginal examinations. Vaginal examinations must be as few as possible, and carried out with a surgical technique.

There is no need of going into details about a vaginal examination. Every man knows how they should be done. It is only a question of whether he will carry out what he knows is right. If we supervise our patients carefully in the latter months of pregnancy, we find out exactly what the relation of the presenting part to the pelvis is, and very few vaginal examinations are necessary when the patient comes into labor. A rectal examination will give you all the points that are necessary to know in practically all cases, and in the few cases where a rectal examination leaves you in doubt, recourse to a vaginal examination may be had. Cut down the number of vaginal examinations and carry the patient along by intelligent palpation and rectal examinations, and the number of septic cases will be reduced.

Next we come to the question of delivery. The constant pawing of the vagina must be stopped. There is absolutely no need of constant vaginal examinations of a patient in labor. We know that these examinations greatly increase the risk to the patient, and they must stop if we are to lower our mortality. When we come to operative work, the technique must be good—not the slipshod way that so many men have in operating. I do not say that every patient must have dry sterile towels surrounding the operative field, for we all know that there are hundreds of operative deliveries successfully carried out without such dry goods. We do know, however, that these sterile goods lower the possible risk of infection. Careful technique in operative work is essential, and unless the men appreciate this fact and carry out a surgical technique, infection will follow. At the present time the teaching in operative obstetrics does not give the students a proper training. Yet they are allowed to go out and operate on any case as they see fit, provided they pass their State Board examination. It is not surprising, therefore, that we find septic cases arising from operative deliveries. The technique that some men carry out in operative obstetrics, who in other surgical work are clean, is astounding. Why they should be so derelict in their duty in obstetrical work, and yet be clean in their surgical work, is beyond my comprehension.

If a puerperal patient runs a temperature, the first diagnosis of this temperature is sepsis until you can prove beyond a doubt that the cause of the temperature is not due in any way to the uterus. For that reason, I believe it is the part of discretion, whenever a puerperal patient starts to run a temperature which is not at once explained that the patient should have an ice bag to the fundus, given a course of ergot, and her shoulders raised up to favor drainage. If it proves to be sepsis, you have gained much in the treatment. If it proves to be something else, the treatment can be immediately stopped and no harm done. The good that comes from such treatment is manifest. Sepsis may come to any one of us at any time, even if we are very careful, but it will not kill except in the very rare case if we at once assume that the temperature that is present is due to sepsis,

MASSACHUSETTS

YEAR		1920	1921	1922	1923	1924
BIRTHS		91859	92207	87636	89119	91463
STILLBIRTHS	NUMBER	3336	3428	3268	3332	3548
	PERCENTAGE	3.6	3.7	3.7	3.7	3.8
DEATHS	NUMBER	698	580	559	498	544
	PERCENTAGE	.7	.6	.6	.5	.5
ACCIDENTS OF PREGNANCY	NUMBER	102	48	56	27	29
	PERCENTAGE	14.6	8.2	10.	5.4	5.3
PUERPERAL HEMORRHAGE	NUMBER	76	74	53	62	69
	PERCENTAGE	10.8	12.7	9.3	12.4	12.6
OTHER ACCIDENTS OF LABOR	NUMBER	104	92	89	73	64
	PERCENTAGE	14.9	15.8	15.9	14.6	11.2
PUERPERAL SEPTICEMIA	NUMBER	195	178	159	125	161
	PERCENTAGE	27.9	30.5	28.	25.	29.5
PUERPERAL ALBUMINURIA AND CONVULSIONS	NUMBER	147	131	130	130	143
	PERCENTAGE	21.	22.5	23.	26.	26.2
ALL OTHER CAUSES	NUMBER	74	57	72	78	78
	PERCENTAGE	10.6	9.8	12.8	15.6	14.3

and do not attribute it to some other possible cause.

I am rather inclined to think that the number of cases of sepsis recorded in the chart is the minimum number that were lost. The cases that are classified as dystocia, deaths from Caesarean section, breech extraction, and under various other headings, usually have an element of sepsis if that is not the entire cause. That we should have any such number of deaths, 161, is a reproach to the medical profession, for we all know that sepsis is a preventable condition, and ought not to exist except very rarely in any man's practice. The difficulty in dealing with this situation is the fact that sepsis is not reportable, that nothing is being done to try to stop it, that there is no concerted effort for improvement, and that no one man has the majority of the septic cases. They are scattered throughout the state, here and there, and each man who has a septic case hopes that he will not have another, yet makes no effort to improve his technique of delivery and operative work.

Now in regard to the deaths from puerperal albuminuria and convulsions. In the last few years as a result of careful medical supervision of large numbers of pregnant patients, it has been proved that eclampsia can be practically eliminated, except in the rare fulminating type. But in order to have these good results there must be complete medical supervision of the patient from early in pregnancy, and the early symptoms of a toxemia of pregnancy must be appreciated by the physician. The gradual rise in blood pressure, with or without albumin in the urine, is probably the first sign of toxemia, and it must be taken as a signal of danger and the patient must be regarded as a possible eclamptic and so treated. That means that if we are going to prevent eclampsia we must have the coöperation of the patient, and the physician must in every case be quick to interpret slight alterations from the normal. In my own work, whenever I find a patient is having a slight rise in blood pressure, she is brought back to the office for supervision at least once a week, possibly a specimen being sent in between the visits to the office. If she develops no other sign but a slight rise in blood pressure, she is regarded as a mild toxemia and treated accordingly. If, however, her blood pressure continues to rise in spite of eliminative treatment, she is put to bed and elimination forced. If she develops clinical symptoms, nausea, headache, vertigo, the question arises of inducing labor. The point that I make is this: We can not stop the toxemias of pregnancy, but with careful supervision and coöperation of the patient we can stop the eclampsias in practically all cases.

The medical profession can not be blamed if they do not see a case until an eclamptic condition has developed. Neither can we be blamed if we are called to a patient in a marked preeclamptic condition who has had no previous treatment. The only way in which we can improve the bad results from puerperal albuminuria and convulsions is for every woman to have complete medical supervision during pregnancy, and that at the present time is far from the case. Many physicians state that they carry out prenatal care, but it is of a most perfunctory sort. Until all physicians can be made to realize that constant medical supervision of pregnant patients is essential, until they are willing to pass this on to the laity, we will continue to have unnnecessary deaths from eclampsia.

What happens in many eclamptic cases is this: A patient has either not been followed satisfactorily or if she has been followed she has been carried along too far, a convulsion occurs, the family is terrified and asks that something be done. The physician becomes alarmed, and attempts to deliver the patient. I am confident that the radical treatment of eclampsia in large series of cases will not give such good results as the conservative treatment. We have changed our point of view in eclamptic work very materially the last few years. As you will recall, it was first manual or instrumental dilatation and delivery of the patient, then came the delivery by Caesarean section, and now the pendulum has swung back to the more conservative method. In England the radical method of procedure never gained a foothold, but it did for some time in this country. Now, however, that is being given up in almost all the large clinics and we are holding strictly to the conservative method, induction of labor by bag or by rupturing the membranes, or by a bougie and packing. I have not dilated and delivered a patient in eclampsia for years, and I do not believe that under any circumstances would I ever again do it. I am perfectly confident that that method of delivery has killed more patients than it has ever saved. We attributed a death following such a delivery to eclampsia, but I am sure that many of these deaths were due to a ruptured uterus as a result of the divulsion of the cervix.

There is one type of case on which a Caesarean section may be justifiable—that is, in a primigravida who has had a toxemia of pregnancy with good eliminative treatment and no improvement in the condition has followed; the baby is of good size, the cervix is conical, and it seems that the patient ought to be delivered. Such cases as these, but they are relatively few, do well with a Caesarean. But for a routine measure, either in toxemia of pregnancy or in eclampsia, Caesarean section is not justifiable.

A glance at the chart shows that there really has been little improvement in deaths from this cause in the past five years, and that this year it is apparently a little higher than last year. The fact that we have lost in Massachusetts 130 cases shows conclusively that medical supervision of the pregnant woman has not been carried out in any degree satisfactorily. Of course,

it is probably true that some of these deaths are due to a chronic nephritic condition, but the fact remains that had they had satisfactory care the death could probably have been prevented.

These, then, are the leading causes of maternal mortality. I can not tell you actually the number of cases that can be attributed to bleeding, but the number of cases that died from sepsis and puerperal albuminuria and convulsions I think is clear. In any study that we make the question naturally arises, "How can we prevent these deaths?" As relatively few cases in Massachusetts are delivered by midwives, it follows that it devolves upon the medical profession to explain these deaths. These three classes of deaths are preventable to a certain extent. The bleeding cases call for good obstetrical judgment if we are to have good results. The septic cases the medical profession is responsible for to a great extent. The deaths from puerperal albuminuria and convulsions depend more upon the patient and the physician —the responsibility is double.

The first thing to do to accomplish any improvement in these results is to see to it that every patient has satisfactory, intelligent medical supervision during her entire pregnancy. This means the education of the patient to come to the doctor early, and it then places the responsibility on the doctor for careful supervision. If this were carried out with every patient, the deaths from eclampsia would be very much diminished. In regard to the septic cases, it means that the physicians must develop a better technique in the delivery of their patients. The fact that we have lost so many cases from sepsis is appalling, and I feel that it is entirely up to the medical profession to improve the situation.

How can it be done? In sixteen states in the Union sepsis is made a reportable disease, but in many of these states satisfactory follow-up work is not done. In New Jersey and in New York, where there are large numbers of licensed midwives, the supervision of these women is very satisfactory. Whenever they lose a patient from sepsis or whenever they have complications, they are immediately questioned and their record is carefully gone over. We would object strenuously to any such supervision of doctors, but on the other hand, unless we improve the situation, will not some such supervision arise? I feel that it is ever so much better for us to improve the situation ourselves within our own councils, than it is to allow outsiders to come in and force us to do something. A careful check-up of every maternal death at least every month would do much to help the situation. At the present time when any study of maternal mortality is made, the facts are not investigated until a year or more after the death has taken place, and the result is that a satisfactory determination of the cause and how it could have been obviated is difficult. The mere statement of fact that one month a certain number of women died in Massachusetts is of no avail. What we must do is to have an intensive study made of each death within a few weeks of that death.

I would be very glad to see each district society of the Massachusetts Medical have a standing committee to investigate the deaths, and then to have the facts which they obtain sent to a larger committee who would use their best judgment in dealing with each individual case.

Many of the maternal deaths are unquestionably preventable, and it is this preventable mortality that we members of the Massachusetts Medical should try to stop. By this study we could readily find out whether the majority of deaths came to those doctors who are members of the Massachusetts Medical, or whether they were of patients who were looked after by men who were not members of any medical society. It could be readily determined what were the really preventable cases, and we could easily point out what measures we should take to improve the situation. If it were known that every maternal death would be scrutinized, I feel very confident that the profession would soon do better work.

At the present time there is nothing done in a constructive way to help lower the preventable death rate. I am confident that unless we take the stand within the profession that we are going to lower this mortality, that we are going to see that better work is done, that the time is not far distant when we will be forced to clean house by outsiders, and the results will be very, very disagreeable. Let us as a group be foremost in studying these preventable cases, so that we soon can say that the purely preventable deaths from childbirth are eliminated and that good obstetrical work prevails everywhere.

THE EYE AND THE INTERNIST*

BY MAURICE FREMONT-SMITH, M.D.

As methods of diagnosis become increasingly complex and the physician grows to depend more and more upon the laboratory, there develops inevitably a tendency to neglect the simpler art of physical diagnosis. We forget that the accuracy of the laboratory is often specious, that many a disease cannot be detected chemically or serologically, and that time and again a diagnosis is written upon the very counten-

*Read before the Waltham Medical Club, April 1, 1926.

ence of the patient, have we but the wit to recognize it.

Diagnostician and criminal detective have this in common: that for each the discovery of a clue is a first and an essential step in the train of reasoning. Each in his own field must be quick to sense the possibilities suggested by the infinitesimal deviation from the normal; the detective by a blood stain or a bit of ash, the medical man by a tiny gland or a barely palpable spleen.

Every square millimeter of body surface may offer a clue. Under appropriate circumstance a single macule may arouse suspicion of typhoid, of measles, or of bacterial endocarditis. The eye, however, holds within its small compass more possible general diagnostic information than can be obtained from any other one region of the body; and this fact entitles it to a very respectful consideration from the diagnostician.

A man was recently admitted into the Boston City Hospital presenting a liver of monstrous dimensions. The discovery of a glass eye suggested the diagnosis, confirmed by watching the urine, normal when passed, darken and become black after exposure to the air. The eye had been enucleated for melano-sarcoma of the choroid.

The discovery in an unconscious patient of unusually soft eye balls may prove of immense practical value, for this is a sign characteristic of diabetic coma and may almost be said to occur in this condition alone.

Loss of the outer third of the brow occurs in myxedema and may give a clue to a frequently difficult diagnosis. Uneven loss of eye-brow suggests late secondary syphilis—especially if irregular loss of hair over the temporal regions coexist. Thickening of the skin and subcutaneous tissue beneath the outer half of the brow is often the earliest symptom of nodular leprosy. An expert in this disease tells me the diagnosis is frequently suspected by palpation of this region alone.

Puffiness of the lids we associate with nephritis. Trichiniasis and arsenic poisoning, however, are not so often suspected; but edema of the lids is characteristic of both conditions and its discovery may save the physician from a mistaken diagnosis of "grippe" on the one hand or of simple gastro-enteritis on the other.

Lid-lag may lead to a suspicion of Graves' disease. Bilateral exophthalmos, a cardinal symptom, may be missed if the physician be not observant.

Protrusion of one eye may result from several general causes. I remember a case which proved to be lymphatic leukemia, referred from the Eye and Ear Infirmary for investigation of protrusion of one eye. Enlargement of a small mass of lymphatic tissue in the orbit must have been responsible. Unilateral exophthalmos may be caused by thrombosis of the cavernous sinus, by aneurysm of the ophthalmic artery, or by tumor or abscess of the orbit. Severe frontal sinus disease may cause it.

Jaundice of the sclerae of course suggests obstruction of the common duct or infection or sclerosis of the liver. We think naturally of gall stones, carcinoma of the pancreas and of "catarrhal jaundice." Other possibilities, however, exist. Acute yellow atrophy is frequently not acute in onset, and may at first closely resemble infectious jaundice; a diagnosis of hemolytic jaundice may be suggested, to be confirmed by enlarged spleen and liver and increased fragility of red cells; or pernicious anaemia may be discovered on examination of the blood smear.

A single petiehal subconjunctival hemorrhage may make the diagnosis of subacute bacterial endocarditis where previously only simple rheumatic heart disease was considered. Conjunctivitis, fever, and measles should be thought of together. Gonorrhea may be suggested by a profusely discharging eye. One of the characteristics of an epidemic of typhus I once witnessed was the early marked concurrent conjunctivitis. Russian physicians looked for the "rabbit eye" to help in making a diagnosis.

Conjunctivitis must be differentiated from iritis, so frequently a sign of extra-ocular disease. The deep purplish circumcorneal injection, the small, sluggish, grayish pupil, the tenderness and dimness of vision are characteristic. (Glaucoma, in turn, must be differentiated from iritis, especially as the drug most useful in the one is in the other absolutely contraindicated. An elderly patient complains of attacks of dimness of vision and presents a dilated, sluggish pupil and a shallow anterior chamber; or there may be an acute onset with pain in the eye and marked circumcorneal injection. Intraocular tension is increased in both acute and chronic forms. The treatment is the instillation of pilocarpine, causing contraction of the pupil. The use of atropine in such an eye often results in entire loss of vision.) In the presence of iritis, syphilis is the first thought; next, focal infection from teeth, sinuses or tonsils. Gonorrhea, usually chronic, may be responsible, and "rheumatic" iritis is described, as is a gouty form and a diabetic. The internist is often tempted to refor the "eye case" to the ophthalmologist without realizing that here may exist as concrete evidence of constitutional disease as in skin, throat, or chest.

Corneal scars are of equal importance. One must remember that the late evidence of a syphilitic keratitis may be slight. Oblique illumination alone may bring into view the delicate grayish or white deposits. Bilateral interstitial keratitis is almost pathognomonic of congenital syphilis. Interrogation will bring out a story of pain, photophobia and disturbance of vision in childhood, with involvement of first one eye

and later of the other, the inflammatory period extending over weeks. I recall a woman of 27 brought to the Emergency Ward during an attack of vomiting which had lasted eighteen days. Both pupils were dilated and somewhat irregular, the left greater than the right. Both failed to react to light; and each cornea presented a few fairly well marked opacities. The complete diagnosis was written in the eyes: congenital syphilis, neurosyphilis, tabetic crisis.

Cataract occurs in diabetes, and when encountered before the age of fifty this disease must be excluded.

Of the twelve cranial nerves three are concerned with the movements of the eye-ball, a fourth with the sensory innervation of the cornea, and the fifth with the organ's main function—vision. A lesion in one of these nerves at any point in its course, is reflected in a functional derangement of the eye. Nerve connections exist, moreover, between ocular nuclei, cerebellum, and inner ear, so that disturbances in these two organs are commonly apparent in the eyes. When, in addition, it is recalled that the optic nerve may be visualized, and changes, not only inherent in the nerve itself, but secondary to variations of intracranial pressure and disease of the sinuses directly observed, the importance of the eye in neurological diagnosis is apparent.

A few general remarks about paralysis of the ocular muscles: Cortical or supranuclear lesions do not cause unilateral ocular palsies as the innervation of each of the eye muscles is a bilateral one. Consequently a unilateral paralysis means a lesion in the nucleus or in the peripheral motor nerve. The nuclei of the third, fourth and sixth nerves, moreover, are so closely crowded together in the floor of the aqueduct of Sylvius that a lesion affecting one nucleus usually involves all; consequently a nuclear lesion generally involves all the muscles of one eye or several muscles*. When one ocular muscle alone is paralyzed the lesion is situated in the peripheral course of the nerve, below the nucleus. Unilateral paralyses are, in fact, most commonly caused by injury to the nerves in their peripheral course and are the result of meningitis, of pressure, of sinus disease, or of neuritis, as that following diphtheria.

The sixth nerve is particularly exposed to injury owing to the length of its course to the orbit from its emergence at the junction of pons and medulla. External rectus paralysis may, therefore, be the only evidence of a generalized intracranial condition, such as meningitis or increased pressure; by the same token paralysis of this muscle alone is of little help in localizing a lesion, as increase of intracranial pressure from tumors far distant may cause injury to the sixth nerve.

A history of diplopia, or the discovery of ptosis, or paralysis of any of the muscles of the eye, suggest a number of interesting possibilities. Syphilis perhaps claims first attention; this is the more likely if the paralysis occur as an isolated finding, or if it be a transient phenomenon. It should not be forgotten that neurosyphilis is often present with a negative blood Wassermann. Multiple sclerosis may also cause transient unilateral ocular paralysis. The ocular paralysis occuring in brain tumor appears usually after other symptoms and signs are already present. Tumors of the cerebellopontine angle in particular deserve attention: beginning usually with the unilateral tinnitus and deafness and attacks of vertigo, the first confirmatory evidence of this condition may be slight weakness of the face, together with weakness or paralysis of the external rectus on the side of the tumor. Corneal anaesthesia (absence of corneal reflex), often the earliest sign of fifth nerve involvement, may be sometimes demonstrated at this time.

In the patient more acutely ill, diplopia or ocular paralysis suggests botulism or encephalitis. Often the diagnosis of the latter condition rests upon a history of transient double vision, or the demonstration of paralysis of one of the ocular muscles. This symptom occurs typically at the very onset of the disease, and may be of only a few hours duration. Loss of the associative movements of the eye caused by a lesion in the posterior longitudinal bundle is another characteristic finding in encephalitis. The eyes show no paralysis; all motions are possible to each eye separately, but the ability to move both eyes in the same direction or to fix both upon one object is lost.

The ocular paralysis occurring in meningitis will be accompanied by the other signs of this disease. Post-diphtheritic neuritis may involve the oculomotor nerve, giving rise to ptosis or squint, or more commonly to paralysis of the ciliary muscle with inability to focus the eyes upon near objects. The branch innervating the pupil is usually included in the neuritis, the pupil failing to contract either to light or to accommodation.

It is interesting that in trichiniasis accompanying the edema of the lids, already referred to, there may be great pain on movement of the eyes due to invasion of the ocular muscles by the embryos.

Contraction of the pupil is brought about through the oculo-motor nerve; dilatation by way of the sympathetics. Stimulation of the sympathetic chain in the thorax, neck or periphery, therefore, causes dilatation of the pupil. Morphine causes contraction of the pupil, through stimulation of the third nerve; morphine poisoning may often be suspected from

*On the other hand, "Nuclear paralyses of the oculo-motor are, in consequence of the great extent of the nucleus, seldom total. The sphincter pupillae and musculus ciliaris generally remain unaffected." Bing.

the pin point pupils; and cocaine poisoning from the marked dilatation induced through stimulation of the sympathetics. Small fixed pupils resembling those found in tabes may be the result of the use of pilocarpine.

Inequality of the pupils is a sign always to be seriously considered. While the pupils may be congenitally unequal, it is never safe to assume this to be the explanation. Many cases of neurosyphilis present anisocoria as the only evident abnormality. I recall one man whose only complaint was nervousness and irritability, for both of which he had good reason. He presented not one single abnormal physical sign save definite inequality of the pupils. He had had no headaches; the pupils reacted to light; the knee jerks were present, but he proved to have positive blood and spinal fluid Wassermanns.

Aneurysm classically produces, through stimulation of the sympathetic chain, dilatation of the corresponding pupil. Other thoracic tumors may do the same. I have been struck with the number of cases of pulmonary tuberculosis showing inequality of the pupils. It is not possible to guess in these cases which apex is involved, as the pupil change is due theoretically either to stimulation or paralysis of the sympathetic fibres; many cases, moreover, show no inequality; but phthisis should be considered when anisocoria is observed.

Irregularity of the pupils when definite and not traumatic in origin must be considered presumptive evidence of neurosyphilis. Besides irregularity, inequality and diminished or absent light reflex are usually found in the neurosyphilitic. (In a study of 50 tabetics recently reported* the pupils were described as normal in only 3 cases. Irregularity as the only abnormality was found in 3 instances. Diminished or absent light reflex occurred in 47. It is interesting that the knee jerks were found normal in 15 of this series, and that the blood Wassermanns were negative in 16. The spinal fluid was abnormal in 48 and the Wassermann positive in 41 cases.)

Definite nystagmus will not be overlooked by the internist if he seek for it. Its discovery at once arouses a number of questions: Are we dealing simply with an error of refraction, as in many cases of nystagmus in children, or with the result of eye strain due to imperfect illumination, as in miners? Is the case we have perhaps labelled hysteria really one of multiple sclerosis? Is the nystagmus due to labyrinthine disease or to tumor or abscess of the cerebellum? Or have we perhaps a case of tuberculous meningitis?

Defects of Vision: Many a dunce cap has sat upon the head of the child who was defective only in sight. This one type of stupidity really curable should not be overlooked; but children often do not recognize the cause of their difficulty. The tests are simple if the physician only suspect.

Yellow vision suggests santonin poisoning; it is not so well known that green vision may be the result of over-digitalization or of abnormal susceptibilty to digitalis. I have seen one such case in my own practice.

Two types of hemianopsia (or blindness of half of the field of vision) are of practical importance: Bitemporal hemianopsia, occurring in pituitary tumor, in which there is a defect in lateral vision in each eye; and homonymous hemianopsia, in which the right or the left half of the visual field in both eyes is lost. This last occurs in lesions of the optic tract posterior to the chiasm. Suppose a brain abscess secondary to mastoid disease be suspected. It may be cerebellar or temporal, and to operate one must open accordingly below or above the tentorium. If a temporal abscess on the left side be suspected, in a right handed individual, aphasia and astereognosis may be found; an abscess in the right temporal lobe, however, may give no clue to its position. The optic radiations, however, pass backward through the temporal lobes. If blindness (complete or partial) can be demonstrated in the left side of both fields, a right temporal lesion may be diagnosed. A hemorrhage affecting any portion of the optic tract posterior to the chiasm will give the same picture. For rough examination the finger held a few inches from the eye suffices.

Impairment of vision may be due to increased intracranial pressure, to diseases of the accessory sinuses (chiefly ethmoid and sphenoid), to poisoning from tobacco, alcohol, wood alcohol, quinine chloral, lead and other industrial poisons. The visual defect in these toxic cases is usually central; peripheral vision remains good, and color sense commonly is affected first.

In chronic nephritis vision is not only commonly affected, but is frequently the first subjective symptom. Sudden blindness may occur in nephritis unaccompanied by retinal changes. (Osler.) In diabetes the vision is not infrequently impaired, great improvement occurring with control of the disease.

The physician may be led to think of polycythemia through visual difficulty unexplained by the ophthalmologist. Friedenwald* has collected a number of cases of this disease showing visual defects with and without changes in the fundi. The symptoms varied from hazy vision and scintillation or blind spots, to complete blindness. Choked discs may be seen in this disease. Internist and ophthalmologist both will do well to remember such a diagnostic possibility.

Transient unilateral blindness may be the first symptom of multiple sclerosis. The point

*Fremont-Smith, M., and Ayer, J. B.: J. A. M. A., Vol. 85, pp. 1282-1284

*Friedenwald, H.: Contributions to Medical and Biological Research, 1919, Vol. 1, p. 495.

of chief diagnostic interest in this disease is its close simulation of hysteria. I recall a woman of thirty-five who complained of numbness of both feet and legs, front and back; more recently of tingling in the fingers. There was no objective sensory disturbance, no ataxia, no abnormality of reflexes; the vibratory and toe position sense were normal. The blood smear was examined and pernicious anaemia eliminated. A diagnosis of hysterical sensory paralysis was made on the basis of absence of objective findings and glove-like distribution of the subjective anaesthesia. Had I known enough at that time to attach the proper significance to the eye history, I should have been less ready to make this diagnosis. Five years before, for one week, the patient had almost completely lost the vision of her left eye. A diagnosis of retrobulbar neuritis was made at that time by a competent ophthalmologist. The sinuses were found negative, and the sight completely returned. A year after my first examination the patient showed the frank picture of multiple sclerosis. There is no mention in my notes of the condition of the abdominal reflexes, the absence of which would have suggested this diagnosis, nor of temporal pallor of the optic discs, another important confirmatory sign. In many cases of multiple sclerosis the spinal fluid will show a pathological gold sol curve, and may show 15 to 30 cells per cmm. and increased protein. In about half the cases the spinal fluid is normal.

Sudden unilateral blindness may be the result of hemorrhage into the vitreous, suggesting hypertension and arteriosclerosis, or it may be due to obstruction of the central retinal artery or vein.

Complete blindness of both eyes may be due to hysteria. Dr. E. W. Taylor used to tell us of an unhappy telephone operator (sic!) who became suddenly totally blind and recovered her full vision at once after the mechanism of her difficulty was explained. Peripheral contraction of the fields of vision is a frequent symptom in hysteria.

The finer points in examination of the fundus may well be left to the ophthalmologist, but the internist should make a practice of examining the fundi, as sole evidence of a disease process may be found here. In a case sent to me because of a doubtful Wassermann the only abnormality on physical examination was haziness of the right disk and an area of proliferation in the retina. This led to further Wassermanns, which proved to be positive.

The chief difficulties met with in the use of the ophthalmoscope are due to lack of acquaintance with the normal appearance of the fundus, and to insufficient dilatation of the pupil. While many eyes can be adequately examined without mydriasis, if difficulty is encountered a drop of homatropine 1% in each eye, instilled at the beginning of the examination will dilate the pupil sufficiently so that by the time general examination is completed a good view of the fundus may be obtained. Atropine or homatropine are both dangerous in glaucoma.

The internist should train himself to decide the following points: Is the disc of normal color, or is there pallor of the whole or of one side of the disc? Can the vessels be traced to their point of emergence, or does the disc bulge outward and cover the vessels as they meet? Are the edges of the disc clear cut or do they fade away into the surrounding retina? The first ocular sign of increased intracranial pressure is usually a blurring of the disc margins and a blurriness about the vessels as they emerge from the optic nerve. One must remember that the development and subsidence of choked discs takes an appreciable length of time. Increased intracranial pressure may be present from one to three weeks before evidence of choking appears; choked discs may exist for some time after the intracranial pressure as determined by lumbar puncture has returned to normal. It should be emphasized that marked choking may exist without visual impairment, so the condition cannot be ruled out without a fundus examination.

Nephritis, diabetes and syphilis cause certain changes in the fundus which are recognizable as abnormalities even by the inexpert. Clouding of the vessels as they approach the disc, blurring of the disc margins, tortuosity and dilatation of the veins, small reddish or black spots of hemorrhage, or white areas of exudate or proliferation are not difficult of recognition. The eye grounds in chronic nephritis are often almost pathognomonic: flame shaped hemorrhages with white spots or radiating lines resembling the spokes of a wheel in the region of the macula. "On the other hand a brain tumor may present opthalmoscopic appearances identical with those of a case of albuminuric retinitis." (May.)

I would not so much stress the differential diagnosis of these various lesions as point out the importance of determining that all is not well with the fundus and referring the patient for further study to the expert.

In the eye and in no other portion of the body may the small arteries and capillaries be directly observed, and their condition determined. Sclerosis of these small vessels is shown by an irregularity of the lumen, beading of the red columns, and by an obliteration or narrowing of the lumen of the veins as they are crossed by the arteries.

It has been pointed out by O'Hare* that the condition of the smaller vessels in no way parallels the degree of arterio sclerosis observed in

*O'Hare, J. P., and Walker, W. G.: Archives Int. Med., Mar., 1924, 33, 343.

the large arteries, and that there may be marked sclerosis in the vessels of the fundus with entirely normal radials and brachials. Moreover, it is probable that the appearance of the vessels in the ocular fundus gives a fair indication of the condition of the other small vessels throughout the body, for example, those of the kidney or brain. The prognostic value of an examination of the fundus is therefore evident.

The eye thus offers a wealth of diagnostic information. Few eye signs are final; most of them are suggestive, merely, of possibilities; but as clues to be followed up and proven or disproven by further study, they are invaluable aids in diagnosis. The eye deserves from the clinician the most profound respect.

EFFECTS OF SODIUM TETRAIODOPHENOLPHTHALEIN IN COMPLETE BILIARY OBSTRUCTION*

BY STEPHEN J. MADDOCK, M.D., AND LESTER R. WHITAKER, M.D.

Sodium tetraiodophenolphthalein is being widely employed for the purpose of cholecystography. After intravenous injection or oral administration it is excreted by the liver and concentrated in the gall bladder where its opacity produces a shadow under the X-ray. Cholecystography, introduced by Dr. Evarts A. Graham[1,2], has, after extensive trial in many clinics, proved to be a valuable diagnostic procedure, and sodium tetraiodophenolphthalein the best medium for the test[3,4]. Since Abel and Rowntree have shown that this substance under normal conditions is excreted almost entirely by the liver[5], it is of vital interest to know what effects the drug might have if the common bile duct were occluded. The study of some of these effects is the purpose of this paper.

The action of sodium tetra*brom*phenolphthalein in biliary obstruction has been observed by Carman and Counseller[6]. In their series several patients with complete biliary obstruction (stone in the common duct) and one with partial obstruction (carcinoma of the head of the pancreas) were injected. These individuals apparently showed a rather severe reaction. In comment the authors merely state that they became ill and remained so for 8 or 10 hours, but do not describe the symptoms further. As a result of this experience Carman and Counseller concluded that complete or partial obstruction to the outflow of bile is a contra-indication to the injection of tetrabromphenolphthalein. They had, however, a high percentage of reactions in patients without obstruction, so that the results are hardly conclusive. None of their patients with obstruction showed a shadow of the gall bladder.

The effect of an intravenous injection of sodium tetra*iodo*phenolphthalein on a patient with obstruction of the common bile duct is unrecorded. Before the drug could properly be given under these circumstances, three questions should be answered:—1. Would a shadow of the gall bladder be produced? 2. Would the substance be more toxic than otherwise? 3. How would it be excreted with its normal mode of exit through the liver cut off? An answer to the first two questions can be given, and to the third in part at least.

EXPERIMENTAL PROCEDURE

Operative Technique:—With dogs, under morphine and ether anaesthesia, the common bile duct was exposed and ligated close to its entrance into the duodenum. In 10 of the 25 animals a single ligature of plain catgut was applied with the expectation that it would become absorbed before a fatality occurred, and thus an opportunity be given for subsequent tests. In one case a bulldog clamp protected with rubber tubing was fixed in place on the common bile duct. In 10 other animals the common duct was ligated with silk, the experiment performed, and the obstruction relieved by a second operation several days later. In 4 cases the duct was doubly ligated with silk and severed.

In cats the operative technique was the same as in dogs save that in all cases silk was used to ligate the duct. In ten of the thirty animals it was doubly ligated close to its entrance into the duodenum and completely severed. A careful search for any aberrant ducts entering the duodenum was made at the time of operation. In only one case was such an accessory duct discovered and this was also ligated.

Post-operative observations:—All the animals with the exception of two cats made good post-operative recoveries. Bile pigment appeared in the urine in every case. Jaundice of the sclerae and mucous membranes developed in 4 to 5 days and was generally quite marked by the end of a week. Serum tests were made on some of the dogs to determine the degree of jaundice produced, the Bernheim icteric index, the van den Bergh, and Fouchet reactions being used. No injections were made in dogs until they developed a high degree of bilirubinemia, i.e., an icteric index of about eighty. This method also enabled us to judge when the catgut ligatures in the animals thus treated had become absorbed, and the obstruction relieved. We found in agreement with Mann[7] that animals with an intact gall bladder do not develop serum jaundice for 24 to 36 hours after ligation of the common bile duct.

*From the Laboratory for Surgical Research of Harvard Medical School, Boston, Mass.

Administration of the drug:—Ten per cent solutions of sodium tetraiodophenolphthalein were made up with distilled water to which 10 per cent sodium carbonate, one cu. cm. in 25, was added to promote solution of the drug, and the whole autoclaved for 20 minutes. This solution was used in dogs but was diluted to five per cent for cats.

The solution apparently grows more toxic on exposure to light and air. We have observed severe symptoms in 3 or 4 dogs after using solutions several weeks old, whereas no symptoms were noted in these same dogs after equal doses of fresh solutions. Care is necessary to insure that the injection is entirely intravenous, for extensive necrosis may result from subcutaneous injection.

The dosage in dogs varied from 0.15 to 0.3 grams per kilogram of body weight, given either singly or in divided doses at intervals of several hours. In dogs no experiments were made to determine the lethal dose, the plan being to give the animals the maximum sub-lethal dose in order to see if gall bladder shadows could be produced.

In 4 of the dogs in which catgut ligatures had been used, the jaundice disappeared eventually, and injections were made one to two months after the operation to see if shadows could then be produced.

In cats with biliary obstruction an attempt was made to determine the minimal lethal dose of the drug for comparison with that of normal animals. All of the cats received single doses. A few were injected a second or third time after intervals of several days.

EXPERIMENTAL RESULTS

X-ray findings:—Roentgenograms were made of the dogs 9 to 12 hours after injection and in some cases as late as 24 hours. In no instance during the period of obstruction were shadows of the gall bladder secured. In 4 of the animals in which catgut had been used, good shadows were obtained after the jaundice had disappeared with the same dose of the drug which had been uneffective shortly after operation. In one of these dogs, at a second operation, the common duct was again ligated with catgut. Again no shadow could be produced until the jaundice had disappeared.

In the series of 10 animals in which silk was used and the ligature subsequently divided, only four survived the second operation long enough to furnish complete data. Three of these after a few days failed to give shadows but after an interval of 30 days good cholecystograms were produced.

The dog in which a bull-dog clamp was placed on the duct lived for 76 days, showing considerable jaundice of the sclerae during this time. He received one injection of sodium tetraiodophenolphthalein 36 days post-operatively, which revealed no shadow of the gall bladder. Post-mortem examination of this animal showed the clamp in place, and the common duct still patent, but with a very narrow lumen. The duct above the clamp was dilated as was the gall badder, but not to the extent which occurs in animals with complete obstruction. This example of partial biliary obstruction in a dog suggests what might be expected in a patient under similar conditions, and agrees with the finding of Carman and Counseller[6] in the case of a patient who failed to show a shadow with sodium tetrabromphenolphthalein and subsequently proved to have partial biliary obstruction due to carcinoma of the head of the pancreas.

As far as we can see, there are three possible explanations for failure to obtain cholecystograms in animals with complete bilary obstruction:—*First*, the effect of increased pressure in the biliary system in inhibiting excretion of the drug by the liver. It is probable that the same conditions prevent the elimination of sodium tetraiodophenolphthalein that prevent elimination of bile pigments in obstructive jaundice. *Second*, damage of the liver due to obstruction. But since it has been found in this laboratory[5] that a marked degree of degeneration of the liver is required to prevent shadow formation—much greater degeneration than that produced by obstruction—it is probable that this is not an important factor. *Third*, the effect of obstruction in preventing entrance of the salt into the gall bladder. In obstruction the normal gall bladder is always distended with concentrated bile. It would therefore seem that further filling with bile containing the salt and its further concentration sufficient to produce a shadow is improbable.

Toxicity in dogs:—As mentioned above these animals were given sub-lethal doses in order that they might serve for further observation. It was found that dogs with complete biliary obstruction will often tolerate 0.2 grams per kilogram of body weight in a single dose without fatal effects, particularly if the dose is divided over a period of several hours. Two of the animals succumbed to this dose, but in both cases they were in poor condition at the time of injection. In the normal dog as previously determined in this laboratory[5] the average single fatal dose is 0.3 grams per kilogram. Hence, the dog with biliary obstruction can tolerate approximately two-thirds of the fatal dose for a normal animal. With doses divided over a period of 12 hours it is possible to give almost twice as much as the single lethal dose without fatality, indicating that even in the presence of obstruction the salt is excreted through channels other than the biliary system. If this is so in man, it should provide a factor of safety in cases of common bile duct obstruction.

Toxicity in cats:—These animals showed

more variation in their response to injections after biliary obstruction than did the dogs.

Of the 30 animals in the series 15 died as a result of injection and 15 from other causes. The average single fatal dose for 15 animals, each receiving one injection, was 0.16 grams per kilogram of body weight, with variations from 0.14 to 0.18 grams per kilogram. This figure (0.16) is to be contrasted with the average single fatal dose of 0.22 grams per kilogram in normal cats[3], showing that animals with obstruction can tolerate about four-fifths or 80 per cent of the lethal dose for normal cats.

It was felt that possibly the animals injected 3 days or less after the operation succumbed more readily than those in which more time was allowed for convalescence, but our data is insufficient to prove this.

Excretion of the Salt:—An attempt was made to study this matter both in normal animals and in those with obstruction of the common bile duct. One drop of a 10 per cent solution of sodium tetraiodophenolphthalein added to 100 cc. of alkaline urine gives it a distinct greenish tinge; yet we have never observed this reaction in the alkalinized urine either of patients or of obstructed dogs after injection of the salt. Neither could we detect a blue color in the bile of injected animals, normal or obstructed, even after clearing it of pigments. Moreover, the blood serum revealed no coloration 5 minutes after injection of the salt.

Since the ordinary color test to reveal the salt was negative in the urine in all cases, recourse was had to an oxidation reaction which would liberate the iodine in the event of its presence in some other combination, and by this reaction positive tests were obtained. When the urine in animals with biliary obstruction contained relatively large amounts of combined iodine, it was demonstrated by the following simple method:

To 5 cc. of urine in a test tube, a few drops of carbon tetrachloride are added followed by 0.5 to 1 cc. of concentrated nitric acid. When the mixture is shaken and allowed to settle, a red to purplish color appears in the carbon tetrachloride at the bottom, indicating the presence of iodine.

Should the amount of iodine be too small, or the amount of organic matter too large to give positive reactions by this test, the following method[9] may be employed:

About 5 grams of sodium carbonate are added to 200 cc. of urine in an evaporating dish. This solution is evaporated to dryness and allowed to carbonize. After cooling 10 to 20 cc. of distilled water are added and the mixture filtered. Carbon tetrachloride and nitric acid are added as previously described, the iodine showing its presence by the distinct coloration of the carbon tetrachloride. It is also possible to obtain the characteristic purple coloration with starch paste in these filtrates after the addition of the acid. This method has proven satisfactory in our work and is not sensitive enough to give positive tests for the amount of iodine normally present in the urine of dogs or human subjects.

By the measures described above traces of iodine were found in the urine of normal dogs the first day following injection of sodium tetraiodophenolphthalein, but not thereafter, while in dogs with complete biliary obstruction considerable amounts were found the first day, and positive tests obtained the second, and even the third day following injection.

The same methods were applied to the other excreta. The vomitus was found to contain iodine as soon as five minutes after injection both in normal animals and in those with biliary obstruction. Likewise the stools, not only of normal animals, but also those with biliary obstruction, proved to contain large amounts of iodine, and it was plentiful in the stomach and intestinal contents of these animals sacrificed 9 to 12 hours after injection.

In complete biliary obstruction then, sodium tetraiodophenolphthalein is excreted by the kidneys and by the alimentary tract, especially the latter; and since the maximal sub-lethal dose can be repeated within 12 to 15 hours, this would appear to be a fairly rapid secondary means of elimination of the drug.

Pathological Findings:—As a rule, cats with recent biliary obstruction which received doses large enough to cause death soon after injection showed considerable damage to the parenchymal cells of the hepatic lobules—in one instance even a central necrosis. In two animals, however, no pathological changes were apparent. In contrast, the animals which survived obstruction 2 to 3 weeks and then died following large doses, showed considerable fibrosis about the bile ducts with some vacuolation and pycnosis of the parenchymal cells.

In dogs, the findings were much the same though there was possibly more parenchymal damage in most cases and less evidence of fibrosis.

Both cats and dogs showed varying degrees of degeneration of the tubular epithelium of the kidneys but just how much of this was due to the salt and how much to the icterus is difficult to say. On the whole, we may assume that excessive doses of sodium tetraiodophenolphthalein produce somewhat more parenchymal liver damage in animals with occlusion of the common bile duct than in normal animals. Yet our experiments indicate that damage to the liver cells thus produced is capable of extensive repair even without relief of the obstruction.

SUMMARY AND CONCLUSIONS

1. In complete obstruction of the common bile duct, no shadow of the gall bladder is obtainable with sodium tetraiodophenolphthalein.
2. Normal animals after intravenous injec-

tion of sodium tetraiodophenolphthalein, excrete small amounts in the urine and large amounts in the feces. Animals with complete biliary obstruction on the other hand excrete considerable amounts in the urine and also large amounts in the feces. Probably on account of this vicarious elimination, the lethal dose of the drug in animals with complete biliary obstruction proves to be only 20 to 30 per cent below that for normal animals. This dose is relatively per kilo 4 to 5 times that necessary to produce a shadow of the gall bladder in man. Furthermore, the damage to the liver produced by sublethal doses, though somewhat more severe in obstructed than in normal animals, is readily repaired.

In all probability then there need be no fear of a fatal outcome from the intravenous use of sodium tetraiodophenolphthalein for cholecystography in a patient who might happen to have a complete biliary obstruction.

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EXPERIENCES WITH CHOLECYSTOGRAPHY*

BY JOHN D. CAMP, M.D., ROBERT J. REEVES, M.D., AND HENRY FIELD, JR., M.D.

THIS study is based on four hundred and seventy-five cases referred to the roentgen-ray department of the Massachusetts General Hospital, for a study of the gall bladder by the Graham method. Since various modifications in the method have appeared since the introduction of the original test devised by Graham and Cole, it is the purpose of this communication to outline our experiences with certain methods of this examination and summarize as closely as possible the results of each. Our experiences so far have been limited to the use of two drugs, sodium tetrabromphenolphthalein and sodium tetraiodophenolphthalein. The latter was given by both the intravenous and oral methods.

The first group of patients was examined following the intravenous administration of 4.5 gms. of sodium tetrabromphenolphthalein. The drug was dissolved in 40 cc. of distilled water. This solution was sterilized in an autoclave and then injected in two doses of 20 cc. each, one half hour apart. Films of the gall bladder were made at five, eight, twelve and twenty-four hours after the administration of the drug. Breakfast was omitted on the morning of the examination and the drug given about nine o'clock. Nothing but water was allowed by mouth until after the twelve hour film had been made. Owing to the reactions experienced with this method only five cases were examined. The last two patients suffered collapse about one-half hour following the injection of the second dose. Because of the apparent risk involved, this method of examination was discontinued.

Excellent shadows of the gall bladder were obtained in three cases and the result considered negative. One gall bladder failed to fill, and a diagnosis of cholecystic disease was made. The result was inconclusive in the remaining case. One negative case and the one positive case were operated upon and the roentgenologic diagnosis was substantiated by the surgeon in each.

Sodium tetraiodophenolphthalein was later substituted for sodium tetrabromphenolphthalein and 3.5 gms. of this drug were given by the intravenous method. The drug was prepared in a 10 per cent solution with distilled water, to which was added 1 cc. of a 10 per cent solution of sodium carbonate for each 10 gms. of the drug. The resulting solution was sterilized in an autoclave and then injected slowly into the vein. Films were made at five, eight, twelve and twenty-four hours following the injection. In many of the later cases a meal was given after the eight hour examination, and a film made one hour later.

Seventy-two cases were examined by this method. About one-half of the patients complained of varying degrees of nausea, about one-half to several hours after the injection of the drug. About one-third experienced vomiting of varying amounts, one-half to several hours after the injection. No severe reactions were encountered and many of the patients experienced no discomfort whatever. Phlebitis and thrombosis of the veins of the arm may occasionally occur. In two cases where a small quantity of the drug apparently infiltrated the soft tissues considerable swelling and soreness resulted. Excellent shadows of the gall bladder were obtained by this method and the density observed was considerably greater than that demonstrated with

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sodium tetrabromphenophthalein. While apparently a safe procedure, the possibility of vasomotor shock must be considered. All the patients were hospitalized during the examination in order that any reaction might be observed. It is generally agreed that the intravenous method is contraindicated in patients with cardiac disease, common duct obstruction and gross hepatic disease.

Four cases with a negative roentgenologic diagnosis were operated upon. Two of these were considered normal by the surgeon and the other two diseased. Of those considered abnormal, one showed several adhesions about the tip of the gall bladder, the result of a previous cholecystostomy. Grossly the gall bladder did not otherwise appear abnormal, and the x-ray shadows obtained were of good density showing that the function was not greatly interfered with. The second gall bladder contained several small stones, the shadows of which could easily have been obscured by the dye in the gall bladder. Grossly there was no marked evidence of disease. It is doubtful if the test could have been expected to give a positive finding in either of these cases.

Eighteen cases with a roentgenologic diagnosis of cholecystic disease were operated upon. Gall bladder disease was found by the surgeon in fifteen. Three gall bladders were considered normal and not removed although one of these showed a definitely enlarged gland at the neck of the cystic duct. In 77 per cent of the cases operated upon the condition was properly diagnosed by the roentgenologist.

The oral administration of sodium tetraiodophenolphthalein was first suggested by Whitaker, who used five grain pills of the drug, coated with salol so that the drug would not dissolve in the stomach. A small series of cases was tried using this method but the results were not as successful as desired. It was found that a number of the pills passed through the intestines without undergoing dissolution, and the amount of the drug absorbed by this method was so variable that the findings were of doubtful value. Our experience was limited to the early form of pills produced and it is possible that the manufacturers have since improved the pill or coating so that more uniform results may be expected.

Another series of cases were examined after administering sodium tetraiodophenolphthalein in formalin hardened capsules containing one gram of the drug. Fifty-eight cases were examined in this manner. While this method is still used by some, our experience with it was similar to that of the coated pills. Many of the capsules failed to disintegrate and the results of the tests were unsatisfactory. By varying the degree of hardening of the capsule it was thought possible to secure a capsule which could be relied upon to dissolve within the small intestines. Experiments in this direction were not entirely successful. Some of the capsules would dissolve but the number failing to dissolve was so variable that the shadows obtained were not uniform and in 25 per cent of the cases it was necessary to make an indeterminate diagnosis. Many of these and some of the positive and negative cases were subsequently examined by the intravenous method to confirm the original findings. The net accuracy of the diagnoses made using formalin hardened capsules was 69 per cent. Many of the errors in this series no doubt could have been avoided, had the method allowed a more uniform and dependable manner of drug absorption.

A small series was examined using a commercially prepared coated capsule containing five grains of the drug. A dose of ten or twelve capsulses was recommended by the manufacturers. This is less than the dose recommended by Whitaker and used by us with hardened capsules. The density of the shadow produced, as could be expected was correspondingly less, and variations in the density of the shadows were harder to detect. While this method seemed to be somewhat better than the formalin hardened capsules, it was found that even a number of the coated capsules passed through the intestines without dissolving, and the results were still unreliable. It is possible that the uniformity of the coating of this product has since been improved upon.

Considerable emphasis has been placed upon the fact that a coating which will not allow the pill or capsule to dissolve in the stomach is necessary. It was believed that the presence of the drug free in the stomach would produce nausea and vomiting and thus interfere with the test. Nevertheless it is interesting to analyze the reactions produced when the hardened capsules were used. Test capsules containing barium showed without exception that when dissolved these capsules disintegrated in the small or large bowel and never in the stomach. Any reaction therefore from the drug given in this manner must come from the presence of the drug in the intestinal tract or from absorption of the drug. 57 per cent of these patients complained of nausea, which came on immediately or up to several hours after taking the capsules. 23 per cent complained of vomiting which commenced one-half to several hours after administration of the drug. 42 per cent complained of cramp like pain in the abdomen and 11 per cent complained of diarrhoea (2 or more stools). It is obvious therefore that nausea and vomiting are not prevented by using a hardened capsule. This fact and the time of appearance of the reaction would seem to indicate that the resulting reaction is probably due to the absorption of the drug and not entirely to the mere presence of it in the small intestine.

Failing to find a reliable means of administering a drug by mouth we were tempted to revert to the intravenous method and especially as

the reactions experienced with it were fewer in number. It was suggested however that plain capsules be tried instead of the hardened or coated ones. In spite of the supposed reaction when given in this manner, and the fact that a certain amount of the drug might be precipitated in the stomach by the acid present, this method seemed to be quite satisfactory. Sodium tetraiodophenolphthalein was prepared in one gram plain gelatin capsules. The patient was instructed to take the prescribed number at 6:00 P. M. with a glass of water and eat supper one hour later. (In the later cases the capsules were taken 15 minutes to one-half hour apart.) Breakfast was omitted the following morning and films made at nine o'clock (15 hours). Another set was made at twelve o'clock (18 hours), following which the patient was instructed to eat a meal rich in fats and return for another film in an hour. Following this the regular diet was resumed. When indicated a fourth film was made at twenty-four hours. It is important that the patient should take no food or liquids except water following supper until after the eighteen hour film has been made. The dosage varied from four to seven grams of drug for each patient, according to the weight or about .08 gms. per kilogram of body weight. The average dose was five grams.

334 patients were examined using plain capsules. In 111 a roentgenologic diagnosis of cholecystic disease was made and in 171 the roentgenologic findings were considered negative. 43 patients in this group were operated upon. Of 33 cases diagnosed as cholecystic disease 30 were confirmed by the surgeon. Of ten cases considered negative by the roentgenologist, 8 were confirmed, one was found to have a cholecystitis and three small stones, and another showed chronic cholecystitis without stones. The net accuracy of the method was 88 per cent.

An analysis of the reactions experienced when using plain gelatin capsules is interesting. 67 per cent of the cases experienced nausea, beginning immediately or up to several hours after taking the drug. 31 per cent complained of vomiting of varying degrees, one-half to several hours after taking the capsules. 31 per cent complained of varying degrees of abdominal pain and 9 per cent experienced some diarrhoea (2 or more stools). When compared with the reaction obtained with the formalin hardened capsules, the nausea produced was found to be slightly greater (10 per cent), and the number of patients vomiting was also slightly greater (8 per cent). The time of appearance of the nausea and vomiting in most instances was quite comparable to that observed when hardened capsules were used. Test gelatine capsules with one exception were found to be dissolved in the stomach at the end of twenty minutes, hence any nausea or vomiting produced by the direct presence of the drug itself in the stomach would tend to manifest itself shortly after administration rather than at a delayed period as was the case in majority of instances. This would seem to indicate that the exciting cause of the reaction is in most part not due to the presence of the drug in the stomach, but probably to the absorption of the drug itself.

We do not deny that a part of the drug is probably precipitated in the stomach by the acid present. How much of this is redissolved in the small intestine by the alkaline media has not been determined. The quality (density) of the shadows produced by this method was excellent and equally as good as that obtained by the intravenous method, hence the amount of drug precipitated in the stomach and not redissolved is not sufficient to interfere with the reliability of the test.

We have had as yet no experience in administering sodium tetrabromphenolphthalein by mouth. It is claimed that this drug when given in this manner and in plain capsules produces less nausea and vomiting than the iodo salt. Owing to the difference in the molecular weight, the density of the shadow produced by the same amount of drug is less than that obtained with sodium tetraiodophenolphthalien.

In comparing the efficiency of the various methods, the oral method seems to have been associated with the best results, at least as far as this series is concerned. The intravenous method was used early in the series and upon the difficult and doubtful cases so that the increase in the diagnostic accuracy of the oral method is no doubt, due in part to our increasing familiarity with the resulting shadows and the changes of pathologic significance. The percentage figures taken alone are somewhat misleading as the intravenous method no doubt is the more accurate procedure.

We do not maintain that the administration of plain gelatin capsules is an ideal method, however as far as oral administration is concerned it seems to be more reliable than any of the other methods tried in this series. The nausea and vomiting are still factors to be eliminated before the test will reach its maximum popularity. In the most recent cases these factors have been markedly reduced by giving the drug in divided doses (one capsule every 15-30 minutes) instead of taking them all at the same time.

The intravenous method while seemingly attended with less nausea and vomiting is not devoid of risk and there is always a possibility of vasomotor shock. In as much as the preparations used in this work are more or less unstable, it is necessary that freshly prepared drugs and solutions be used. These should be kept as much as possible from the light.

INTERPRETATION OF SHADOWS

In as much as the density of the shadow depends on the concentrating ability of the gall bladder, the test is first, so to speak, one of

gall bladder function. Using the intravenous method, the gall bladder should be visible and contain a fair amount of the dye at the end of five hours. The maximum density is reached from eight to twelve hours, when the shadow may also be somewhat smaller. Using the oral method a fairly good shadow should be visible at twelve to fifteen hours following the taking of the drug. The maximum density is reached at eighteen to twenty hours. Following the ingestion of a meal rich in fats, the shadow is considerably diminished in size and the gall bladder may have emptied so completely as to be difficult of detection.

The examination was considered negative when a shadow of homogenous density, comparable to an established normal appeared at the various accepted intervals and diminished in density following the ingestion of a meal rich in fats.

Variations in density have come to be depended upon as indications of pathology. Gross variations in quality are not difficult to appreciate. Less marked variations must be interpreted with caution as one must take into consideration the size of the patient as regards the amount of soft tissue superimposed upon the gall bladder, the quality of the negative, the amount of vomiting produced with probable loss of a certain amount of the dye, and if coated capsules or pills have been used the number that have remained undissolved.

Variations in size and delay in filling and emptying of the gall bladder are probably of some pathologic significance, but they cannot as yet be accepted as reliable indications of pathology. Further experience with the test will no doubt establish their value.

Provided the patient has taken a sufficient amount of the drug, failure to visualize the gall bladder usually means one of several things, mechanical occlusion of the cystic duct by calculus, stricture, adhesions, inflammatory reaction or new growth; gross hepatic disease as cirrhosis, hepatic or metastatic malignant disease which influences normal liver function and disease of the gall bladder interfering with its ability to concentrate the drug. Failure of filling has also been observed in pancreatic disease, with and without common duct obstruction and diabetes. It is not a constant finding with common duct obstruction as an occasional hydrops of the gall bladder may be demonstrated.

Mottling of the shadow due to the presence of non-opaque calculi is not infrequent and these stones otherwise invisible are brought to light. The mottling may vary from isolated areas of diminished density produced by solitary calculi to almost complete obliteration of the shadow by many closely packed stones. In the presence of calculi the concentrating ability of the gall bladder may or may not be interfered with. It is not uncommon to see one or two negative stone shadows within a dye filled gall bladder, the density of which otherwise appears normal. It is obvious that calculi within such a gall bladder in order to be seen must be of such a size as to displace dye sufficient to be demonstrated on the film. A few very small calculi will be completely obscured by a gall bladder which is still able to concentrate the drug, and it is doubtful if such cases can be detected by this method. It is possible also that a gall stone of increased density visible in a roentgenogram before ingestion of the drug may be obscured by the dye in the gall bladder if the concentrating ability of the organ has not been impaired, in the same manner that a stone in the kidney pelvis may be obscured in a pyelogram. Such mistakes should be obviated by making films previous to the administration of the drug. Occasionally non-opaque stones will absorb sufficient of the dye as to render them opaque after the gall bladder has evacuated the dye. Shadows of diminished density due to superimposed gas in the bowel may be difficult to differentiate from negative stone shadows. As a rule the gas shadows will change in shape or position or they may be changed in relation to the gall bladder by varying the tilt of the x-ray tube. If there is still doubt as to the nature of the shadow a film made following an enema will usually show considerable difference in the appearance of the colonic shadows.

Other than the previously mentioned sources of error should be included mistakes arising from the interpretation of negatives of poor photographic quality. A small amount of motion may obscure the outline of a dye filled gall bladder and thus suggest that it has not filled, or a negative stone shadow may be obscured by motion not sufficient to obscure the outline of the dye filled organ. Failure to include the gall bladder in the area exposed may provoke the erroneous opinion that it has not filled.

SUMMARY

1. A review of the experiences with cholecystography in a series of 475 cases is presented. Both the intravenous and oral methods were used.

2. Sodium tetrabromphenolphthalein when given intravenously produced such a reaction in the patient that its use in this manner was not considered safe.

3. Sodium tetraidophenolphthalein was given intravenously without a severe reaction in 72 cases. About one-third of these experienced some nausea or vomiting.

4. Sodium tetraidophenolphthalein in plain gelatine capsules given by mouth, was used in 334 cases. 67 per cent of these patients experienced some nausea. 31 per cent complained of varying degrees of vomiting.

5. The oral administration of sodium tetraiodophenolphthalein in coated or hardened capsules and pills did not give consistent results.

Many of these failed to dissolve and the resulting shadows were not reliable. Their use did not eliminate nuasea and vomiting.

6. The interpretation of the roentgenologic shadows and the possible sources of error of the test are discussed.

ACRODYNIA. WITH REPORT OF CASES*

BY WILSON POWELL, M.D.

It is not the purpose of this paper to discuss the symptomatology of acrodynia in detail. The papers of Wood[1], Zahorsky[3], Byfield[4], and others have been so complete that we have but little to add to the clinical findings already mentioned in the literature. Once having seen a typical case the picture is so impressive one never forgets it. The severity varies, however, in different countries and seemingly in different parts of this country. The lightness of the attack and the presentation of an atypical picture may sometimes make diagnosis difficult even to the initiated. The name acrodynia is but descriptive of one symptom, the many reports of cases so resemble each other in their description of symptoms that one feels justified in regarding it as a clinical entity. We have seen some cases, however, which presented all the clinical symptoms; photophobia, assuming peculiar attitude in bed, loss of appetite, restlessness, rash on the body, stomatitis, loss of weight, paresthesia, hyper-irritability, and desquamation, yet did not show any definite areas on the palms of the hands and the soles of the feet, which have given rise to the names "Pink Disease," "beefy hands and feet." Some oedema of these areas were present, however, and desquamation later noted. Because of the oedema of the subcutaneous tissues so frequently present in these cases Blackfan. Swift[2], Butler[6] and others prefer the term erythredema rather than acrodynia.

In some cases excessive perspiration is noted; this is less marked in others. Some abdominal distension was noted in a fatal case reported by Davis and this symptom has been noted in one third of the cases. Sometimes there is a severe stomatitis while this symptom is not evidenced in others. Some show apparent upper respiratory infection, while in other cases this is not seen. The gastro-intestinal tract, according to Zahorsky[3], was normal in one half of his cases.

HAS THIS DISEASE LONG GONE UNRECOGNIZED (?)

From a study of the history of the cases here reported we have concluded that acrodynia has long gone unrecognized by the general practitioner in this country. In fact, many of the most active pediatrists in this city state that they have never met with this disease in private practice. The case which came under our observation at the Boston Dispensary Hospital for Children had been previously diagnosed as scarlet fever. One case here reported from the Children's Hospital was, before admission, treated for scarlet fever.

D. H. Patterson[7] reports a case brought to him at Great Ormand Street Hospital, London, had been so recognized. Since the appearance of Bilderback's[2] article in 1919 and the many contributions to the literature following this, many cases of acrodynia have been reported from various parts of the country. Before the days of the Wassermann test it was sometimes confused with syphilis and we have no doubt that many cases have been overlooked or wrongly diagnosed. This disease has also been mistaken for eczema, prurigo, German measles, impetigo, erythema, urticaria, arsenic poisoning, tuberculosis, malnutrition of undetermined origin. Acrodynia reports have come to us from Australia, Canada, Mexico, India, China, The Near East, Northern Africa, and several European countries. No cases have, however, been reported from South America.

ETIOLOGY

In all cases here reported the diagnosis of pellagra was not considered as this condition is extremely rare among children in this part of the country. Few observers believe that this is a deficiency disease. Vipond[8], who has studied hundreds of pellagra cases, fails to note any association of acrodynia with pellagra. Few who are familiar with pellagra admit the identity of the one with the other. In none of our cases studied could we find any vitamine deficiency; all had been fed a liberal and well balanced diet. All came from homes of the middle class and none from the extremely poor. In the cases reported by Vipond[8] there was observed a general adenopathy which included the axillary and inguinal glands especially, these in one patient being visibly enlarged, pointing to a generalized infection. He states that the onset of his cases was accompanied by a nasal discharge, and believes this to be the point of inoculation. Several observers have found organisms in the nasal discharge of their patients. Vipond[8] took cultures from these enlarged nodes, withdrawing a drop or two and inoculating fresh human blood. These later showed a Gram positive organism of slow growth in the primary blood serum tube.

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With the courtesy of the Superintendent of the Children's Hospital, Cases 2, 3, 4, 5 and 6 are reported.

The majority of cases which have come to our notice have had some apparent involvement of the upper respiratory tract. Rodda[9] reports seventeen cases, eleven of which gave history of a preceding infection, and believes that careful observation would reveal a preceding upper respiratory condition in all cases. In 60% of his cases there was a definite time from the period of infection to the onset of hyperirritability, that is, an incubation period of one to two months. We believe with Byfield[4], Rodda[9], and others that acrodynia is caused by some organism which finds a lodging place somewhere in the upper respiratory tract. This may be in the tonsils, the adenoids, the sinuses, the teeth, mouth, and gums.

Zahorsky[3] states that the throat may be congested but the tonsils not necessarily enlarged. Sometimes softening of the gums and loosening of the teeth occurred in his cases. He questions whether climate makes any difference in such respiratory involvement. The nose in most cases is the seat of obstructive symptoms. In one case now under treatment at the Children's Hospital, suffering from a severe stomatitis, a culture taken from the ulcerated gums showed a fairly large number of Spirillum Vincenti and Bacilli Fusiform. The predominating organism was a bacillus resembling the Bacillus Diphtheriae in size, shape and staining. In view of the fact that Vipond also found a Gram positive organism this may prove of interest as being a possible etiological factor in the causation of this disease. X-ray of the sinuses in this case showed also some obstruction of the right antrum, the remaining sinuses being negative except for faint clouding of the ethmoids on the right side. Films of the lower jaw showed no evidence of infection around the teeth. Byfield[4] regards acrodynia as a primary disease of the nervous system and thinks the lower motor neuron is involved. He states, "there seems to have been a preponderance of sensory manifestations with a mild affection of the motor nerves. It may be an improper diet rendering the nerve tissues and cells more liable to the influence of bacterial poisons which have a special affinity for such tissues." Rodda[9] is doubtful whether such a strange disease "occurring rather rarely; in so prevalent a field of infection, is the result of a specific organism or the reaction of a peculiar type of child to the more common infecting organisms." The nasal pharyngitis which is usually present sometimes develops into a bronchitis or bronchopneumonia. Field regards it as an infected sensory polyneuritis. Parkes Weber's case so closely resembling acrodynia is better described as a case of dermato polyneuritis. Strachan[11], in his report of one hundred and twenty-one cases which occurred at Kingston, Jamaica, calls these "malaria multiple peripheral neuritis" but Sandwich commenting on such regards these cases as post dysenteric neuritis. We have seen several cases of joint involvement following dysentery and there is a possible relation between the diarrhea noted in some of the histories and this condition, though it is hardly likely that such amounted to a dysentery. Vipond mentions the possibility of a vaso motor neurosis. The question of endocrine deficiency may also be regarded and cases have been reported of complete recovery following the administration of thymus gland.

We are somewhat confused as to the name we should give to this disease; its etiology remains unknown. The writer believes acrodynia to be due to some specific organism not yet isolated or as yet unrecognized by observers in this field. This organism producing a toxin which being absorbed into the tissues gives rise to nervous and toxic manifestations. In some cases the tonsils, the adenoids, or the nasal sinuses being the seat of the organism, in other cases the mouth and gums being a primary focus.

PATHOLOGY

But few cases have come to autopsy. Warthin[13] recently reports a pathological study of two necropsy cases. In Parkes Weber's[10] case X-ray showed "in bones of the hands there were some areas of calcification or of decalcification". Byfield[4], in reporting the postmortem of a fatal case, mentions the involvement of an occasional anterior horn cell of the spinal cord and gliosis about the central canal with oedema of the central root. Wood[12], regarding the French epidemic of 1828-30 as being one of acrodynia, reports negative findings in case which came to autopsy. The histological picture in one of the cases here reported showed it to be consistent with erythredema, the epidermis being slightly red and the substrate rather dense. There was marked hyperkeratosis and slight parakeratosis, the epidermis was irregular and the papillae varied in size.

In one case which came to autopsy at the Children's Hospital, Wolbach states that the pathology was not at all illuminating, there was a superficial resemblance of the skin to the skin in pellagra, but this meant nothing, a change in the corium and thickening of the epidermis was noted. The post mortem proving nothing as to the pathogenesis of the disease.

TREATMENT

Vipond[8], using vaccine from the organism taken from enlarged glands, treated two of his cases with good results. Some observers have given thymus gland on the basis of some endocrine disturbance. Treatment with mercury quartz vapor lamp has been beneficial, while many cases are reported of complete recovery under symptomatic treatment and the feeding of a high caloric diet rich in vitamines, in the majority of such cases treatment has been prolonged over a period of many months. Rodda[9] has never seen a case in which, after tonsillectomy, there did not fol-

low a complete and early recovery. In one case at the Boston Dispensary Hospital for Children, a case which presented the typical picture of acrodynia, the tonsils were inflamed and hypertrophied. Tonsillectomy was performed two days after being admitted. This was followed by such rapid and complete recovery the child was able to leave the hospital one month after admission. In two cases at the Children's Hospital in which tonsillectomy has been performed, recovery was not shortened over the average period, so this procedure has not been followed as a routine, with the result that the condition has been prolonged over a period of months. This has led us to believe that while in some cases the organism does not find its lodging place within the tonsils, their enucleation may not be of any particular benefit, but once the focus of infection is evident either in sinuses, gums, adenoids, or teeth and such focus cleared up, recovery will be rapid and complete. We can see no reason for not doing a tonsillectomy as a routine procedure. Without doubt this method has in many cases been of great benefit. Failing these procedures symptomatic treatment, allied with heliotherapy and the feeding of a high caloric diet rich in vitamines, is indicated.

Case 1—Female, age 2 yrs. Admitted September 5, 1925.

Family history and past history unimportant.

Present Illness—Mother noted three weeks before admission that the child became easily tired and had a feeling of malaise; this feeling became gradually worse until August 30, when she became very drowsy, even comatose. She vomited at intervals during the night and appeared feverish. On Monday her condition was about the same. She was constipated until time of admission. Wednesday night mother noticed the rash on fingers of both hands. Physician was called and diagnosed influenza. Her temperature at this time was 103° F. On Friday night a rash appeared on the soles of the feet, but the mother did not notice this condition on any other part of the body. Child continued to vomit, was very restless, with high fever. At this time, mother stated, the whole body seemed to be tender to touch, especially the extremities. She had always been a well nourished child; her diet consisted of milk, cereals, vegetables, potatoes, eggs, meat, spaghetti and fruits. She had not been in contact with other children in the neighborhood who gave evidence of any infectious disease. She first complained of pain in her stomach, then in her throat. There had been some cough and a small amount of mucus expelled. The child also had some coryza.

Physical examination showed her to be a well developed and well nourished child, extremely restless and fretful, turning her head from side to side, seeking to arrive at the most comfortable position. She slept only at infrequent intervals and during short periods of from five to fifteen minutes. Administrations of hypnotics did not seem to relieve this condition. Some sordes of the lips present. Her tongue was heavily coated, tonsils enlarged and injected. The eyes showed some slight photophobia. The right ear externally showed a pinkish condition similar to that of the palms of the hands and soles of the feet. Both hands showed a pinkish coloration involving the palms as far as the first line of the wrist, also involving the external surface of the fingers from the extremities to the distal phalangeal joint. Hands were slightly swollen, soles of the feet were similarly involved. The extremities were painful on examination. There was general hyperaesthesia of the whole body, especially the abdomen. The white blood count 11,600. The red blood count 4,200,000. Three days after admission she showed bladder retention; some desquamation was noted at this time. She ate better, being frequently fed and in small amounts. September 9, 1925, blood picture showed achromia of red cells, red cells in rouleaux, polys. 69%, lymphocytes 27%, eosinophiles 3%. On September 11, 1925, tonsillectomy was performed on advice of Nose and Throat Department. A decided improvement followed this tonsillectomy. Her appetite improved, desquamation became more marked, child was less restless, took more notice of her surroundings, slept and ate better. So rapid was this improvement following the tonsillectomy she was discharged cured on October 4, 1925, just one month following admission.

Case 2—J. L. Female, age 3½ mos. Sent to the O. P. D. of the Children's Hospital by local medical doctor, who was unable to diagnose her condition. The family history showed that the mother had myxoedema while pregnant. Father had toxic goitre. She had always lived in the country where there was plenty of fresh air and sunlight. Her birth weight was 9 lbs. Labor was long and difficult. She was breast fed for six weeks, then on Dextri-Maltose and cow's milk dilution for one month. Mellin's Food for one month. Stools were normal in color and three a day. Sleep was very irregular, some days sleeping only for two or three hours. She was irritable and cried a great deal. For seven weeks she had some discharge from her right ear. She had never gained much since birth, subject to frequent vomiting spells on breast as well as on formula.

Physical examination showed a poorly developed child with a skin rash over her body, especially extremities and abdomen. Extremities were hot to the touch. Colorful palms and soles. Abdomen distended. The throat, mouth, gums were negative. Impression: Poorly nourished child with feet and hands suggestive of acrodynia. She was admitted to the Hospital and treatment instituted. This was supportive in nature and local measures resorted to for her skin condition. Her vomiting gradually ceased, then placed on 2% lactic acid feeding and finally to whole milk dilution. The Wassermann and tuberculin were negative. She was discharged three months after admission with normal temperature and upward weight curve.

Case 3—R. R. Female, age 1 yr. Admitted May 14, 1925. Chief complaint—Failure to gain, rash on the body. Family history negative. Past history—Breast fed for three months, then on cow's milk dilution, unboiled, 48 ozs. in 24 hours. Stools, two daily before admission. Development normal. Present illness—Three and a half months ago child was noted to be irritable and very restless; three months ago rash on her body was first noticed. Her hands and feet were cold, desquamation later took place from hands and feet. The family physician had made a diagnosis of scarlet fever. Since then skin manifestations had continued, except that hands and feet were not so cold as formerly. During the past three months restlessness had increased. On admission her weight was 17 lbs.

Physical examination showed a fretful, restless, irritable child making peculiar movements and assuming bizarre attitudes. Examination of skin showed a rash covering the entire body, diffuse maculo-papular in nature. The rash was more marked on the face, chest and abdomen, these areas being described as of a dull red color. The palms of the hands, fingers, soles of the feet were involved in this coloration. The feet were cold, the skin of the hands, feet and ankles and the wrists showed some areas of coarse desquamation. Examination of the mouth

and throat was negative, though the posterior cervical glands were enlarged. Knee jerks were equal and not active. The child was admitted to the hospital and on June 13, 1925, the following discharge summary was made: A 12-months-old baby entered with complaint of body rash and red desquamating hands and feet. Three months before admission irritable and restless, no remarkable neurological findings and no remarkable throat findings. Gradual improvement of skin lesions under local treatment. Tonsillectomy was performed and the child showed some improvement after this, but such improvement was not marked or accelerated.

Case 4—R. A. P. Male, age 1 yr., 10 mos. Italian parentage. Admitted January 27, 1925. Family history negative. Birth weight 7½ lbs., breast fed for 10 months, development normal. Present Illness—Two weeks before admission the feet became swollen, pinkish and cold. A rash appeared on the abdomen, food was refused. He persisted in burying his face in the bed clothes. Diet had consisted of milk, cereal, vegetables, orange juice and cod liver oil. Vomiting infrequently for three days. He disliked to be handled, and coryza had been present for three days before admission.

Physical examination showed a child somewhat dehydrated, with a rash on the palms and soles, pinkish in color and papular in some areas. Some erythematous rash around the knees. Fingers were swollen. Throat was slightly injected. The case was referred to the hospital and was there symptomatically treated. The following discharge summary was made May 10, 1925: Admitted with complaint of rash on hands and soles of the feet. From local pustules staphylococci have been cultured. His general condition has improved since admission, tuberculin negative. He takes feedings well and is discharged as improved.

Case 5—M. G., age 2 yrs. Scotch parentage. Male. Family history negative. Past history—A full term child, instrumental delivery. Birth weight 7 lbs Breast fed for one month, then on Dryco formula. Diet had been liberal and well balanced till time of present illness, which occurred March 1, 1925. Two weeks before this date, however, she had had vomiting spells and was feverish. Later became irritable and fussy. Her appetite was poor, stools normal, drowsy, for two days previous to admission. A rash on the face noted for four days and on her hands for three days before coming to hospital.

Physical examination showed a well nourished, well developed child, teeth in good condition, tonsils hypertrophied and injected. There was moderate enlargement of all superficial lymphnodes. Knee jerks hyperactive. The skin of hands and feet showed erythematous papular lesions, especially on the dorsal surface of the hands. The lesions beginning in the region of the wrists and ankles were without any sharp line of demarkation. Between the fingers were large numbers of fine, small papules. No vesicles or desquamation observed at this time. Over the abdomen were some very fine papules and an area of erythema. He became worse for two weeks, then a general improvement was noted on March 21, 1925. He was treated symptomatically in hospital and followed in the O. P. D. Here he returned April 11, 1925. Tonsils were then enlarged and child was still irritable and had a slight cough. Lamp treatment had been instituted in the hospital and child was given a high caloric diet. This had resulted in slow improvement. The blood findings had showed nothing remarkable and histologic examination of piece of skin showed findings already indicated in this paper. The epidermis being slightly red, the substrate rather dense, marked hyperkeratosis and slight parakeratosis. The epidermis was irregular and the papillae varied in size. These findings were consistent with those observed in erythrematema.

Case 6—P. D. Female, age 3 yrs. Admitted December 11, 1925. Temperature 103, pulse 140, respirations 45. The family history was unimportant. Past history showed the child to have been breast fed for 18 months. Orange juice at 5 months. Present dietary consisted of fruits, meat, vegetables, macaroni, eggs, bread, butter, jelly, bananas and soups. She had lived on a farm. Present Illness—Two months ago she had an attack of bronchitis, recovery in two weeks. One month ago severe head cold and nasal discharge lasting for ten days. Lacrimation had been in evidence. She held her head downward, kept her eyes closed and her face against the pillow. A week after the beginning of her coryza a "pimply" rash appeared over the chest. This spread progressively toward the extremities. Itching of the skin was noticed. The rash seemed to be at its worst two weeks before admission. For two months she had been noticed to rub her hands together and to pick at the soles of her feet. Her gums had become swollen and six days before admission one tooth had fallen out. Through the entire illness she had been fretful, constipated, perspired freely. Her abdomen was distended. Her appetite variable.

Physical examination showed the whole body covered with a maculo-papular pustular rash, most marked from the nipples downward. No photophobia present. The lips showed marked congestion with edema and scarring of the lower lip. Many teeth were missing, particularly the lower ones; all were loose. A purulent discharge was noticed coming from these teeth cavities and the gum margins along such cavities were soft, edematous, almost necrotic. The tonsils were enlarged, cryptic and somewhat injected. Heart and lungs negative. The abdomen rounded and tympanitic. No masses or tenderness. Upper extremities showed the palms of the hands slightly redder than normal. The skin felt thick and rough, with tiny nodules apparently of the same nature as the pustules over the body. The lower extremities showed several ulcerative lesions of the soles and toes where the skin had been scratched off, but no definite areas of redness could be noted. The knee jerks were active and equal and blood examination showed hemoglobin 80%, W. B. C. 23,200, R. B. C. 4,848,000, Polys. 82%, lymphocytes 14%, large mononuclears 3%, blood platelets increased. A note made on December 13 states that a smear from the teeth cavities showed diplococcus, streptococcus, staphylococcus, and many pus and epithelial cells. Three days later another smear from the ulcerative gums showed a fairly large number of Spirillum Vincenti and Bacillus fusiformis. The predominating organism was a bacillus resembling the Bacillus Diphtheriae in size, shape and staining. Treatment was symptomatic, seeking to relieve the itching. Calomine lotions applied to the skin and a liberal diet allowed. Therapy with the mercury quartz lamp was instituted and slow but continued improvement noted. At the time of writing the rash has practically disappeared, there is no longer any evidence of stomatitis, she eats and sleeps better, and there is no photophobia, so that the child is well on the road to recovery.

It is well to note that in none of these cases reported from the Children's Hospital in which tonsillectomy was done has there been any decided improvement following such an operation. Improvement without tonsillectomy has been slow but progressive.

SUMMARY

1. A variability of symptoms is sometimes observed and the typical picture of acrodynia is not always present.

2. This disease has long gone unrecognized in this country.

3. A gram positive organism has been found

in the upper respiratory tract. This may be the etiological factor in causing the disease.

4. Pathology has thus far revealed nothing as to the nature or pathogenesis of acrodynia.

5. Removal of foci of infection in the upper respiratory tract has, in most cases, met with success in the treatment. Failing this, symptomatic measures together with diet and the use of heliotherapy, is of value.

6. Six cases are here reported.

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THE COPPER CONTENT OF DISTILLED LIQUOR ON SALE IN MASSACHUSETTS*

BY HERMANN C. LYTHGOE, BLANCHIE O. BERRY, SYDNEY H. HALL

Copper was formerly regarded by the medical profession as being nontoxic when present in food. In 1891, the State Board of Health of Massachusetts had occasion to prosecute a large importer of foodstuffs for selling peas containing copper, alleging in some of the indictments that the copper contained in the peas might render them injurious to the health of a person consuming the same. In the defense of this case, seven reputable practicing physicians testified that the copper in these peas was not injurious to health, and the defendant was acquitted.

Dr. John F. Thresh, the *London Lancet*, March 28, 1925, in a recent article upon the action of water on copper pipes, reiterated this belief, stating that if certain cases involving jury action are excluded, "there is no evidence of copper in small quantities being a poison or of its being able to produce a condition of chronic poisoning." He quotes two authorities in support of these views, but neglects to quote the classic report of the Referee Board upon the same subject with a different opinion.

Dr. F. B. Mallory, *Am. Jour. Pathology*, January, 1925, in an article upon the relation of chronic poisoning with copper to hemochromatosis, reports upon nineteen cases coming to autopsy, ten of them in one year. Of these cases, nine had used alcohol for years, usually to excess; six were exposed to occupational chronic copper poisoning; one had used a copper kettle for boiling water; and three were entirely negative. He was able to obtain similar pathological conditions by feeding copper and copper compounds to animals.

It is commonly known that copper is a universal constituent of shellfish, including oysters, clams, lobsters, crabs, crayfish, mussels, snails, and of certain other white-blooded animals, the copper being used as a catalyst in a similar manner to the use of iron by red-blooded animals. Copper has been known to be a constituent of milk and the quantity is increased by pasteurization if the milk comes in contact with copper during this process. Copper has been found in the milk of humans and in the urine of breast fed children. The copper is no doubt in the organic form in most of these natural substances used as food. Copper was found by the Department of Public Health in one instance in carbonated water, due to a brass valve poorly tinned and badly worn. We have recently found copper in bottled soft drinks in quantities as high as 11 milligrams per liter. This has been traced to the use of copper containers not kept in sanitary condition.

Dr. Mallory, *Am. Jour. Pathology*, January, 1925, reported copper in a sample of distilled spirits manufactured by one of the cases he studies. W. Cruess, *Prog. Agr. Lit.*, 57,366, through C. A. 6-1651, reported finding 15 mg. of copper per liter in a sample of pomace brandy and concluded that it came from the still and the condenser. He believed this was due to the solvent action of the vapors and by mechanical entrainment of copper dissolved in the still.

Distilled spirits are extensively manufactured and sold in Massachusetts. The Department of Public Health is required by statute to make examinations of intoxicating liquors submitted by police departments. Prior to June, 1919, this work was very slight. At that time, however, the work suddenly became large, and since 1920 has been increasing steadily. The material submitted under this law had either been actually sold or was intended for sale and the sale was interrupted. During the year 1925, 9,403 samples were submitted from 165 cities and towns of which 1,690 were beer, 204 were cider, 873 were wine, 5,362 were distilled spirits, 14 were flavoring extracts, 1,006 were alcohol and 254 were of a miscellaneous nature not included in the above classification. Much of the distilled spirits was uncolored.

It has been undoubtedly established that the continuous ingestion of copper over a long period of time will cause serious functional disturbances with possible death and it has also been shown that distilled liquor is liable to con-

*Presented before the Northeastern Section of the American Chemical Society on Friday, January 8, 1926.

tain copper. Because of the fact that we are in the unique position of being able to ascertain the quality of the intoxicating liquor consumed by the people of Massachusetts and can therefore obtain valuable statistical data, this work was undertaken.

In November, 1924, 84 samples of uncolored distilled spirits were examined qualitatively for copper and 9, or 10.7%, were found to contain

TABLE 1

DISTILLATION OF 2 LITERS DILUTED DISTILLED SPIRITS—100 C.C. FRACTIONS TAKEN

Fraction	Per cent. alcohol by weight	Acid, as acetic, per cent.	Copper, milligrams per liter
1	54.1	0.014	1.
2	49.2	0.010	–
3	43.3	0.007	–
4	35.3	0.014	–
5	26.3	0.014	3.
6	18.0	0.010	4.
7	10.5	0.005	5.
8	4.9	0.007	4.
9	2.2	0.021	7.
10	1.0	0.010	6.
11	0.2	0.007	6.
Total distillation	24.49	0.011	3.3

it. These 9 samples were delivered to Dr. Mallory, who caused quantitative determinations to be made in connection with his work previously mentioned. He reported to us that the copper varied from a trace up to 26 milligrams per liter. These figures are included in Table 7. This investigation was continued in the laboratory of the department, and 1,544 samples have

TABLE 2

DISTILLATION OF 2 LITERS OF CIDER—100 C.C. FRACTIONS TAKEN

Fraction	Per cent. alcohol by weight	Acid, as acetic, per cent.	Copper, milligrams per liter	Ratio of copper to acid
1	55.6	0.038	16	0.042
2	50.4	0.043	20	0.046
3	44.9	0.048	24	0.050
4	36.3	0.055	39	0.071
5	26.8	0.062	60	0.097
6	17.1	0.074	80	0.108
7	9.1	0.086	100	0.116
8	4.2	0.096	100	0.104
9	1.7	0.098	110	0.112
Total distillation	27.34	0.067	61	0.091

been examined, of which 163, or 10.6% contained copper. The bulk of these samples was uncolored, but many samples of colored material have been examined. During the month of June, 1925, for instance, 137 samples of colorless material were examined, of which 5 contained copper; and 203 samples of colored liquor were examined, of which 30 contained copper. The copper was determined colorimetrically, by the ammonia or the ferrocyanide method, using the Duboscq colorimeter or Nessler tubes for comparing the color of the sample with that of the standard. In the case of uncolored material, a suitable quantity as indicated by the qualitative test was dealcoholized by evaporation, diluted to the necessary volume, and treated with the reagent. In the case of colored material, 50 c.c. was dealcoholized, treated with nitric and sulphuric acids in a Pyrex Erlenmeyer flask, and the acid was evaporated nearly to dryness. If the organic matter was not destroyed, more nitric acid was added and the evaporation repeated. The residue was diluted with water, made alkaline with an excess of ammonia, and if blue, was transferred to a Nessler tube for comparison with the standard. If the solution was not blue, it was made acid with acetic acid, treated with potassium ferrocyanide, and the brown color, if any, was compared with the standard. Lowe's iodometric method was used to some extent and is now preferred when the copper exceeds 5 milligrams per liter because of its greater accuracy in these concentrations.

TABLE 3

DISTILLATION OF 2 LITERS OF WINE DISTILLATE COLLECTED IN 100 C.C. FRACTIONS

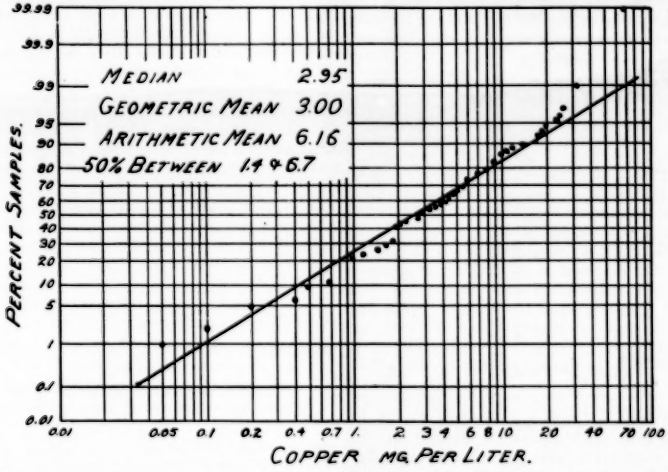
Fraction	Per cent. alcohol by weight	Acid, as acetic, per cent.	Copper, milligrams per liter	Ratio of copper to acid
1	54.6	0.16	52	0.032
2	49.6	0.17	64	0.038
3	43.5	0.20	100	0.050
4	35.1	0.25	130	0.052
5	25.9	0.31	220	0.071
6	16.8	0.36	300	0.083
7	9.3	0.40	350	0.087
8	4.9	0.45	410	0.091
9	2.5	0.48	420	0.087
10	1.6	0.51	440	0.086
11	1.1	0.53	440	0.083
Total distillation	22.27	0.347	266	0.077

The quantitative data obtained from the first nine samples containing copper indicated that the quantities of copper formed a logarithmic probability series. Ninety per cent. of the 63 samples first found to contain copper varied in copper content from 0.5 to 25 milligrams per liter and the figures plotted as a logarithmic probability series.

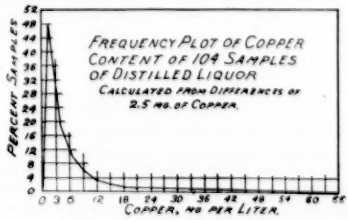
Chart No. 1 is a logarithmic probability chart of the results obtained from 104 samples containing from 0.05 to 69 milligrams of copper per liter. Each point plotted represents the total per cent. of the samples at and below the copper content indicated. The figures from which this plot is computed are found in Table No. 7. Chart No. 2 is a frequency plot calculated from figures obtained from the line of probability drawn upon the probability plot.

Copper may be introduced into distilled beverages in at least four different ways. If the fermented material is made or kept for any length of time in contact with copper, and if frothing occurs during distillation, mere traces of copper may find their way into the distillate.

VARIATION IN COPPER CONTENT OF 104 SAMPLES OF DISTILLED LIQUOR



Somewhat more copper may be found in the distillate if a tin lined copper condenser is used, and the lining is in part worn off. If a copper condenser is used larger amounts of copper will be found in the distillate, depending upon the concentration of the alcohol, the acidity of the



material being distilled, and the size of the condenser. Copper may also get into distilled liquor by keeping the material in contact with copper after distillation, as for example, by the use of a brass spigot in the barrel in which the liquor is stored.

The copper content of distilled liquor on the market prior to June, 1919, is unknown. We have been able to obtain a few samples of such distilled liquor from friends who had the material in stock prior to January, 1919. One sample, containing 50% of alcohol by volume, was stamped as being bottled in bond during 1914. The odor and color reactions corresponded to those of a whiskey aged in wood. This sample contained one milligram of copper per liter. Another authentic pre-prohibition sample contained 4.3 milligrams of copper per liter. Some samples were free from copper. The number of samples examined was insufficient from which to draw any definite conclusions as to the probable copper content of distilled liquor sold prior to 1919, but we have established that such liquor did in some instances contain copper.

In order to ascertain the extent of copper contamination by the use of a copper condenser, one was obtained from Colonel Alfred F. Foote, Massachusetts Commissioner of Public Safety. This condenser, which had been seized in a liquor raid, is a copper coil of seven turns, the tube being 3/8" in diameter, and 168" long. It was connected with a large Pyrex flask by means of a glass tube with rubber connection. Two liters of material was usually used in each distillation, and the distillate was removed in 100 c.c. fractions. Each fraction was examined for the percentage of alcohol, percentage of acid as acetic and for the amount of copper. Proportionately smaller quantities of the distillate were collected when less than two liters of material was available.

The first material experimented upon was uncolored, distilled liquor of the variety designated as "moonshine," containing about 49% alcohol. The first fraction of the distillate contained 89% of alcohol and considerable copper due to solution of copper salts left on the inside of the condenser from prior use. The next succeeding

fractions of the distillate were free from copper, but when the alcoholic content dropped to 60%, copper began to be dissolved in increasing quantities as the alcohol decreased as shown by the intensity of the qualitative tests. The copper was not accurately quantitated in these distillates. Similar material was diluted to about 15% alcohol and distilled. The distillate in the first fraction contained 54% alcohol and one milligram of copper per liter. No copper appeared in the next three succeeding fractions, but in the fifth fraction, containing 26% alcohol, the copper content was 3 milligrams per liter. The last fraction containing any alcohol had a copper content of 6 milligrams per liter. In experimenting with fermented material different results were obtained. In distilling cider, all fractions of the distillate contained considerable copper because of the higher acidity. The last portion which contained any alcohol contained as high as 110 milligrams of copper per liter.

TABLE 4

REDISTILLATION OF A MIXTURE OF EQUAL QUANTITIES OF THE 11 FRACTIONS OBTAINED IN THE WINE DISTILLATION

Fraction	Per cent. alcohol by weight	Acid, as acetic, per cent.	Copper, milligrams per liter	Ratio of copper to acid
1	66.8	0.062	20	0.032
2	64.0	0.066	20	0.030
3	61.1	0.072	23	0.032
4	55.6	0.096	30	0.031
5	47.8	0.120	48	0.040
6	37.4	0.174	75	0.043
7	24.4	0.211	115	0.054
8	12.3	0.288	155	0.054
9	4.8	0.313	180	0.053
10	1.7	0.324	210	0.064
Total distillation	37.59	0.173	88	0.051

TABLE 5

DISTILLATION OF 1200 C.C. CORN MASH

Fraction	Per cent. alcohol by weight	Acid, as acetic, per cent.	Copper, milligrams per liter	Ratio of copper to acid
1	35.3	0.168	150	0.089
2	23.4	0.232	280	0.121
3	11.0	0.288	340	0.118
4	4.0	0.324	280	0.086
5	1.3	0.362	280	0.077
6	0.8	0.393	280	0.071
Total distillation	12.8	0.247	268	0.108

TABLE 6

REDISTILLATION OF A MIXTURE OF EQUAL PORTIONS OF THE 6 FRACTIONS OBTAINED IN THE DISTILLATION OF THE CORN MASH

Fraction	Per cent. alcohol by weight	Acid, as acetic, per cent.	Copper, milligrams per liter	Ratio of copper to acid
1	49.6	0.069	35	0.051
2	40.5	0.108	65	0.060
3	23.1	0.156	110	0.070
4	8.1	0.203	160	0.079
5	2.0	0.234	230	0.098
6	0.4	0.252	200	0.079
Total distillation	20.61	0.170	133	0.078

TABLE 7

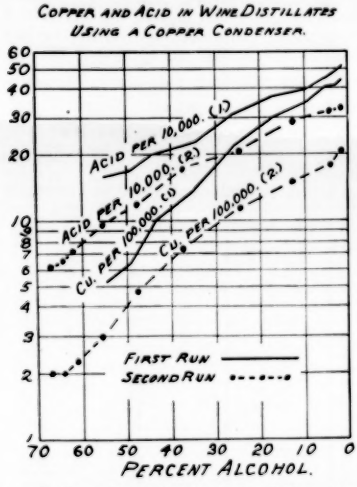
RESULTS OF COPPER DETERMINATIONS

Copper, milligrams per liter	Samples	Sub totals	Per cent. of total samples
0.05	1	1	0.96
0.1	1	2	1.92
0.2	3	5	4.8
0.4	1	6	5.8
0.5	4	10	9.6
0.7	1	11	10.6
1.0	11	22	21.2
1.2	2	24	23.1
1.5	3	27	26.0
1.7	4	31	29.8
1.9	1	32	30.8
2.0	11	43	41.3
2.1	2	45	43.3
2.3	2	47	45.2
2.8	2	49	47.1
3.0	4	53	50.9
3.3	2	55	52.9
3.4	1	56	53.8
3.7	2	58	55.8
3.9	1	59	56.7
4.3	2	61	58.6
4.4	3	64	61.5
4.5	2	66	63.4
4.7	2	68	65.4
5.0	1	69	66.3
5.2	1	70	67.3
5.6	2	72	69.2
5.7	2	74	71.2
6.0	2	76	73.1
7.0	3	79	76.0
8.0	3	82	78.8
8.3	2	84	80.8
9.0	2	86	82.7
9.7	2	88	84.6
10.0	2	90	86.5
11.0	1	91	87.5
12.0	1	92	88.5
14.0	1	93	89.4
17.0	1	94	90.4
18.0	2	96	92.3
19.0	1	97	93.3
20.0	1	98	94.2
24.0	1	99	95.2
25.0	1	100	96.1
26.0	1	101	97.1
32.0	2	103	99.0
69.0	1	104	100.0

The figures in Table No. 1 were obtained by distilling a diluted portion of commercial distilled spirits; those in Table No. 2 were obtained from a sample of cider; those in Table No. 3 were obtained from a sample of wine; and those in Table No. 4 were obtained from a redistillation of a mixture of equal portions of all the fractions containing alcohol obtained in Distil-

lation 3. Tables No. 5 and No. 6 give similar figures from a sample of corn mash.

Chart 3 is prepared from data in Tables No. 3 and No. 4, and shows the variation of the copper and the acid content of the different fractions collected and their relation to the alcohol content of the different fractions of the distillate. The alcohol is plotted as per cents on the arithmetic scale. The copper and acid are plotted upon the logarithmic scale, the copper as parts per 100,000 and the acid as parts per 10,000. The copper curve in both the first and second distillation increases at a greater rate than the acid curve, but this increase is not as marked in the second distillation as in the first distillation. The increase in copper as the distillation proceeds is largely due to increase in acidity. The ratio of copper to acidity increased as the distillation proceeded, reached a maximum, and then decreased except in the redistillation of the wine in which instance, the ratio increased as long as any alcohol came over. No copper determinations were made upon those portions of the distillates free from alcohol.



We have made no investigation of the copper content of the relatively small amount of liquor legally sold upon prescription. This liquor is difficult to get except for legitimate medical purposes. It is not improbable that copper is present to some extent in this material.

CONCLUSIONS

Alcoholic distillates from fermented liquor obtained by means of a copper condenser will be more or less contaminated with copper.

Copper was present, to some extent, in the pre-prohibition distilled beverages.

Copper is present in about 10% of the distilled beverages sold or intended for sale in Massachusetts, occurring quantitatively in accordance with the laws of logarithmic probability series.

We wish to express our thanks to Dr. F. B. Mallory, Pathologist, of the Boston City Hospital, for suggesting this investigation, and to Miss Kennetha M. Ware and Miss Marian D. Alcott, our former associates in the Department, for assistance in the analytical work.

Food and Drug Division,
Massachusetts Department of Public Health,
February 1, 1926.

DIFFICULTIES MET WITH IN THE INTERPRETATION OF TRENDS OF CANCER MORTALITY

BY HERBERT L. LOMBARD, M.D., AND CARL DOERING, M.D.

In the course of the recent investigation of cancer in Mass., conducted jointly by the State Departments of Public Welfare and of Health, the cancer mortality has been studied for the light it might throw upon the situation.

Both the State Bureau of Vital Statistics and the Federal Bureau of the Census publish figures on cancer mortality in Massachusetts. Both reports are based upon the death certificates filed with the state registrar. Copies of the certificates are forwarded by the registrar to the Bureau of the Census. Prior to about 1916 there are large discrepancies between the two reports. We consulted Dr. William H. Davis of the Bureau of the Census and Mr. Edgar Bowers, the state registrar, and received their comments which largely explain the differences. We feel that it might be of interest to point out to the profession these discrepancies in the published statistics to illustrate the difficulty in drawing inferences from them with regard to cancer mortality.

ALL FORMS OF CANCER

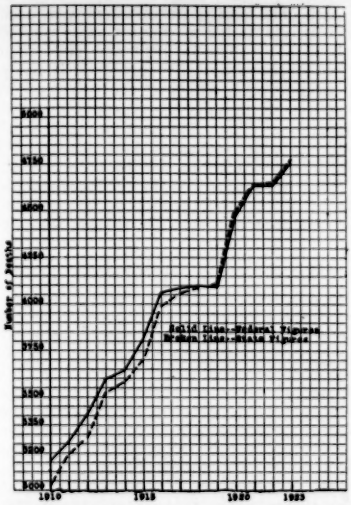
Graph 1 shows the two estimates of total cancer from 1910 to 1923.

Prior to 1910 the estimates are also at variance. To save space and to emphasize the change in estimates which took place around 1916 only the limited range from 1910 to 1923 is shown. Actual cases are used in preference to rates since estimations as to annual populations might well differ in the two offices.

The discrepancies prior to 1916 can be explained only by differences in interpretation of the primary cause of death on the death certificate. We have reason to believe that the method of allocating the primary cause of

death in the state office was uniform for fully 15 years of this period. On the other hand from what evidence we can gather it is very likely that the method used in the federal office was changing from year to year but we have no notion of the extent of these changes. We presume that they were more or less consistent and that from them finally evolved the first publication in 1914 by the federal office of the Index of the Joint Causes of Death. It seems that when two causes of death were given on a death certificate, prior to 1916 the two offices independently chose one of them as the primary cause. If the federal office gave cancer as a cause of death in preference to most all other causes of death prior to 1914 as it did after 1914 then it would have reported at least as many cancers as primary causes as those that were designated by the physicians of the state as the primary cause. On this assumption it is likely that the state must have accepted the physicians designation of the primary cause to a great extent and that the federal office largely tabulated as primary causes the cancers that were designated by physicians as secondary causes.

MASSACHUSETTS
CANCER—ALL FORMS



GRAPH 1. Total cancer deaths in Massachusetts. Federal and State estimates.

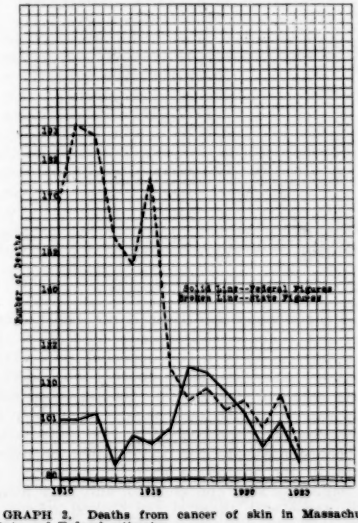
In 1914 the federal office made a special survey of cancer. The deaths in the ten original registration states reported by the federal office in this year are considerably greater than those in the adjacent years 1913 and 1915 and they illustrate the effect of an investigation. They also comprise the most accurate estimate of cancer mortality. In the federal estimate for Mass. the effect of the investigations is not apparent and the year 1914 is not sensibly altered in its relation to the adjacent years or to the general trend of previous and past years. This seems to suggest that the reporting of cancer either as a primary or a secondary cause by physicians of the state met the test of accuracy of the federal investigation.

CANCER OF THE SKIN: CANCER OF STOMACH AND LIVER

Graphs 2 and 3 show the difference between the state and federal estimates of cancer of skin and cancer of stomach and liver.

The large differences here represented are probably due to the different methods of selecting the primary site of the cancer when two or more sites were given on the certificate. They are also likely to be due in large measure to different interpretations of the International Classification of Causes of Death.

MASSACHUSETTS
CANCER—SKIN

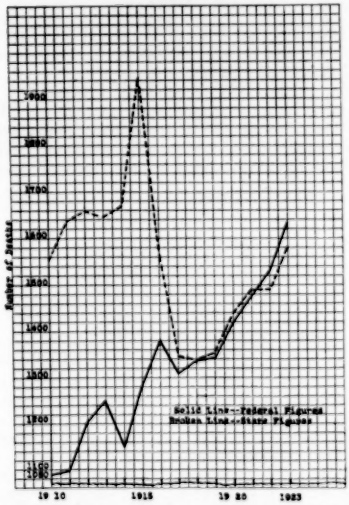


GRAPH 2. Deaths from cancer of skin in Massachusetts. State and Federal estimates.

Again it is noticeable that the 1914 federal investigation did not materially affect the trend of skin cancer but that it did cause a fall of cancer of the stomach in that year. The trend of skin cancer estimated by the state has been falling between 1910 and 1916 while the federal figures show a slight increase over that period. Skin cancer is a reliable cause of death without

autopsy and is easily diagnosed compared with internal cancers. The downward trend since 1910 fits in with what one would naturally expect upon any rational consideration of the diagnosis, treatment and percentage of cures of skin cancer in a state with a medical centre and with a highly urbanized population. It is, however, impossible to draw any conclusion in the face of the two conflicting estimates. Cancer of the stomach and liver is not easily diagnosed and is not a reliable cause of death without autopsy. It is to be expected that there should be large differences in such an indeterminate cause of death. The federal office considers cancer of the liver usually secondary to cancer elsewhere. After 1916 the state office has been guided by the 1914 Index of Joint Causes in its tabulation and its estimates of both cancer of skin and stomach and liver practically agree with those of the federal office.

MASSACHUSETTS
CANCER—STOMACH AND LIVER



GRAPH 3. Deaths from cancer of stomach and liver in Massachusetts. State and Federal estimates.

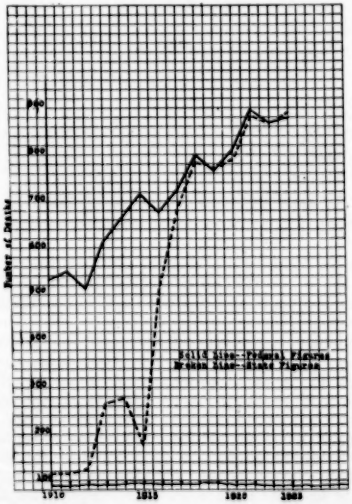
CANCER OF BUCCAL CAVITY: CANCER OF PERITONEUM, INTESTINES AKD RECTUM: CANCER OF BREAST: CANCER OF FEMALE GENITAL ORGANS: CANCER OF OTHER OR UNSPECIFIED ORGANS

In all these the federal estimates are higher than those of the state. The defect in the federal estimates of skin, stomach and liver are compensated for by an excess in the remaining forms. Probably what the state designated stomach and liver the federal office to a large extent included under peritoneum, intestines and rectum, and what the state designated skin was called bucecal eavity and others or unspecified by the federal office. It is not possible to find out exactly what has happened. After 1916 both estimates approach one another for every form.

CONCLUSION

Prior to about 1916 the state and federal offices estimate cancer mortality differently. This is due mainly to the different interpretations of the primary cause of death. After 1916 the state office edited its certificates in accordance with the Index of Joint Causes published by the federal office in 1914 and subsequently the two offices practically agree. It is not possible to determine which of the two conflicting sets of data represents the true picture of cancer mortality. They represent two different but equally reliable estimates and illustrate the magnitude of variation due to mere classification. Having regard for the errors of diagnosis made by physicians themselves, by estimating them at almost any fair percentage, the superimposed error of classification is large enough to obscure the effect of the diagnostic error, in the total error of estimate of cancer mortality. The data illustrate the need of the standardization of methods of classification when different places are to be compared. The experience after 1916 shows the result of standardized classification. The standardization, however, has led the state office to duplicate the work of the federal

MASSACHUSETTS
CANCER—PERITONEUM, INTESTINES AND RECTUM



GRAPH 4. Deaths from cancer of the peritoneum, intestines and rectum in Massachusetts. State and Federal estimates.

office which except for the desirable priority of the published state report seems to be unnecessary. The need for it is apparent in the federal office which endeavors to render the statistics of the registration area comparable with those of other countries as well as those of the states comparable to one another. This demand is not imposed upon any state office. If state offices edited their certificates as little as possible the resulting statistics would show more clearly the status of medical reporting, the relations between the incidence of any disease and the status of reporting and would make it possible to allow more definitely for the corrections, invariably necessary due to the carelessness of medical reporting, which are made before it is possible to accept the reported deaths from any given cause to be the actual number that happened.

From the foregoing it is obvious that without collateral information from the physicians of the state, inferences drawn from the statistics would be questionable. The medical profession has coöperated with the state authorities in this matter in a most splendid manner and its bulk of evidence collected in various ways contributes in no small degree to an understanding of the situation in Mass.

The state authorities found it advisable to study the actual death certificates of persons dying with cancer in order to avoid the concealment of facts possible under any system of classification. This involved the study of over 20000 certificates filed at the State Registrar's office. The registrar Mr. Edgar Bowers practically put his entire office at the service of those making the survey. His coöperation was necessary throughout the survey and his advice helpful in the disentanglement of the numerous statistical problems that arose.

THE PREVENTION OF TUBERCULOSIS IN INFANTS AND YOUNG CHILDREN

It is important to bear in mind that according to present day teaching even tuberculosis which shows itself in its full manifestation in later life owes its origin to childhood. We know that the cutaneous tests like the Von Pirquet so rare during the first few months of life increase with frequency with every year to reach its highest point between 10 and 14 years of age.

If this tubercular infection begins in childhood what organs are apt to be involved in infancy and the examination of post mortem findings in Medins series of 616 infants under one year show Lungs only 78; Bronchial glands, 17; in both lungs and bronchial glands without involvement of the digestive tract, 194; in digestive and Mesenteric glands only, 6; in portal glands and liver only, 1; in Respiratory digestive tract, the large total of 313; location not given 7.

This would lead to the final conclusion that lung and bronchial glands stand first, that the Mesenteric glands involved primarily are negligible and that the bronchial glands, lungs and mesenteric form a very large total.

1. It is also necessary to note that there is a vast difference between Tubercular infection that gives no marked manifestations and Tubercular diseases with the symptoms and its pathologic changes.

Then our observation of children should be made on all those showing anaemia, rickets, bronchial conditions, glandular involvement, especially those living in dusty and unsanitary surroundings.

2. Those children of known exposure to tuberculosis, what aids have we in diagnosis?

1. The intra dermal list of 1-50—1-10 neg of tuberculin which in children indicates positive tubercular infection or tubercular disease.

2. X-ray pictures of the chest because every clinician knows the difficulty in examining small children for tuberculosis he has no co-operation from the child in production of the various types of breathing in bringing out rales by cough and production of voice sounds.

3. Careful and repeated examination of contacts especially under 14 years of age with the use of x-ray and fluoroscope.

4. Separation of infants from tubercular surroundings.

5. Careful education of parents and guardians as to food values, rest, habits of cleanliness, fresh air and especially the necessity of sun light.

6. The dangers of diseased tonsils and adenoids as being the portals of entry. For as Ravenal says 25 children autopsied ranging in years between 3 months and 13 years he found seven cases with tubercular diseased tonsils.

7. That even joint tuberculosis so prevalent in young life according to Jones and Lovett are secondary manifestations of primary infection of lymphatics of the mediastinum of the abdomen or cervical glands.—*Buffalo Sanitary Bulletin.*

A VERDICT OF $3000

The Supreme Court of Wisconsin has affirmed a judgment of $3000 in favor of the plaintiff who sued a doctor who had treated a patient by inserting a radium capsule into the nostril which capsule passed to the posterior nares and was swallowed. An operation was done to recover the capsule, and it was for the pain, suffering and damage due to the operation that suit was brought. The verdict evidently depended on the length of string attached to the capsule, this being only two inches. Under the circumstances the court held that since the string was too short to warrant faith in controlling the capsule that the verdict was just.

Case Records
of the
Massachusetts General Hospital

ANTE-MORTEM AND POST-MORTEM RECORDS AS USED IN WEEKLY CLINICO-PATHOLOGICAL EXERCISES

EDITED BY
RICHARD C. CABOT, M.D., AND HUGH CABOT, M.D.
F. M. PAINTER, A.B., ASSISTANT EDITOR

CASE 12211

AN INTERESTING PROBLEM IN ANTI-SYPHILITIC THERAPY

MEDICAL DEPARTMENT

A colored girl thirteen years old entered September 18, nine months and a half before her second admission. The chief complaint was hemoptysis. She had a family history of lues. A grandmother had heart trouble with dropsy. The girl had had measles, whooping cough, chickenpox and at five years an attack of pneumonia. At two and a half years she was treated at the Eye and Ear Infirmary for interstitial keratitis. The eyes improved and then relapsed. At ten years she was seen in the Out-Patient Department of this hospital, was found to have a strongly positive Wassermann, and was given a course of arsenical injections and mercury. While under treatment she complained frequently of sore gums and occasional bleeding. The May before admission mercury was abandoned. From June 24 to September she had ten arsenical injections and some potassium iodide.

P. I. The morning before admission she awoke to find her mouth full of clotted blood, and found that fresh blood oozed from her gums, requiring frequent rinsing of the mouth. Quite profuse bleeding persisted all day in spite of treatment in the Emergency Ward. She had no other complaints.

P. E. A thin rachitic girl with frequent nervous movements and twitches, almost choreiform. Over the legs and upper arms were fine petechiae. There was bleeding from all the gums. The eyes were closed because of photophobia with lacrimation. The pupils were dilated with homatropin and could not be examined; regularity questionable. Sclerae showed marked opacities. Mucous membranes injected. Teeth rachitic, not definitely Hutchinsonian; several carious molars. Tonsils enlarged, especially the right. Area of white scar or questionable mucous patch on right, but obscured by blood. Some petechiae on the buccal membrane. Chest dull. Left apex dull. Occasional râles at left apex behind. Harrison's groove and rosary. Location of apex impulse of heart and percussion measurements not recorded. Pulmonic second sound markedly accentuated. Abdomen and genitals negative. Elbows: Marked prominence of olecranon with deformity and limitation of extension. Shins: Anterior bowing and widening. Knee-jerks hyperactive. Ankle-jerks absent.

Laboratory data. Urine cloudy at two of three examinations, specific gravity 1.014 to 1.028, no albumin, amount 27 to 80 ounces when recorded, 1-5 red cells at two of four examinations of sediments, leucocytes at three. Blood: Leucocytes 10,500-20,400-10,000, polynuclears 51-78 per cent., hemoglobin 60 to 55 per cent., reds 4,275,000-3,250,000-5,200,000. Entrance smear showed central achromia, no poikilocytosis, anisocytosis, polychromatophilia, stippling or young forms, platelets practically absent. September 19 slight anisocytosis and poikilocytosis, slight increase in central pallor and an occasional stippled cell, no platelets. September 20 reds practically the same, two or three small groups of platelets seen, reticulated cells 2 per cent. September 25 reds practically normal in size and shape, no achromia, phagocytosis or polychromatophilia, platelets present though somewhat reduced. Wassermann negative. Bleeding time 35 minutes, clotting time 7-10 minutes, with calcium chloride 18 minutes. Non-protein nitrogen 25 mgm. per 100 c.c. Stools September 19, guaiac strongly positive.

Temperature 97.6° to 99.3°, pulse 80 to 106, respiration normal.

The day after admission the gums were still oozing. The purpura was more extensive. Hematomata formed wherever venepuncture was attempted. A trial was made at giving sodium thiosulphate by mouth. By September 20 there was very little bleeding, and after that day none. September 26 she was discharged to the Out-Patient Department with recommendations for no therapy except potassium iodide for four months.

Interval History. After her discharge she was treated at the Eye and Ear Infirmary Out-Patient Department for interstitial keratitis. The eyes slowly improved. From December to February she had twelve injections of iodobismuth quinine at the Out-Patient Department of this hospital. February 20 the eyelids, which had been more or less swollen since October, were more swollen and she was almost anuric. A syphilologist suspected heavy metal toxicology and advised sodium thiosulphate. February 25-28 this was given, .2 to .65 grams daily. February 28 there was vomiting. She was now voiding a little. February 26, March 2 and March 4 the urine showed large amounts of albumin. The sediment showed numerous leucocytes and casts.

Second admission, March 3.

P. E. A well nourished girl lying quietly with eyes closed by edema of the lids. Entire face edematous. Teeth carious. Marked pyor-

rhea. Cervical, inguinal and left epitrochlear adenopathy. No edema of extremities. No ascites. No râles.

Laboratory data. Urine more or less turbid at all of six examinations, 25-32 ounces, specific gravity 1.015-1.025, large amounts of albumin at all examinations, sediment showed red and white cells at all examinations, loaded with both at the first, brown granular casts at three, granular casts at the fourth, red blood cell casts at one. Blood: Leucocytes 12,700 to 68,000, polynuclears 76 to 91 per cent., hemoglobin 75 to 60 per cent., reds 2,710,000 to 3,230,000. Smear: reds and platelets normal; no achromia. Nonprotein nitrogen March 5 122 mgm., March 8 150 mgm., March 14 225 mgm., uric acid 16.6, chlorides 446, phosphorus 9.1, calcium 9.6.

Temperature 96.4° to 100.2°, with a rise to 103.3° the day before death. Pulse 95 to 110 until March 8, afterwards 100 to 133. Respirations normal to March 8, afterwards 25 to 60.

For the first three days the patient had anuria. March 5 one half a cubic centimeter was removed by catheter. March 6 she voided two ounces. March 8 she was very uncomfortable, with so much difficulty in respiration that she had to sit up for relief. The abdomen was slightly distended and showed a fluid wave. The edema of the lids had gone down. The heart showed a double aortic second sound giving a gallop rhythm. She was now passing not more than three or four ounces of urine daily. 200 c.c. of five per cent. sodium bicarbonate was given intravenously and vigorous catharsis. She continued however to void not more than three and a half ounces a day. Practically all fluid taken by mouth was vomited. An attempt to give another injection of intravenous sodium bicarbonate March 10 failed and resulted in extravasation about the veins causing great pain. She was given 1000 c.c. of saline subpectorally. A minim of croton oil failed to produce catharsis. At midnight March 11 the condition became worse. Next morning the face was edematous and the right leg was becoming swollen. She had passed no feces since the previous day. Another dose of croton oil was given without catharsis. She had severe intestinal cramps, requiring morphia. The abdomen was soft. Two doses of elaterin gr. 1/30 failed to produce catharsis. There was little if any fluid in the chest. The edema and the ascites were still present. March 14 the general condition was better. She voided nine ounces. Her intake was twenty ounces but she vomited thirty-four ounces. Small diffuse punctate gray dots were noted on the gums. She was given 200 c.c. of five per cent. sodium bicarbonate intravenously. On the 16th she was brighter but considerably weaker. The urinary output had increased from three to eight ounces. The edema was less but still present. Bowel movements had begun again with watery evacuations. The fluid intake was very low. She vomited practically everything taken by mouth, and took little nourishment. There was nothing to account for the rise in temperature March 16 except the pus in the urine and the 30,000 leucocyte count. That night she had acute abdominal cramps. The liver was enlarged almost to the umbilicus and was very tender. The quadrate lobe seemed more enlarged than the surrounding liver. There was a painful hard localized swelling over the left zygoma, not reddened or hot, tapering in the direction taken by the parotid duct. Next day she was more comfortable. The temperature and leucocytosis were at their highest. March 19 she was much worse. There was now consolidation in the left base and the right upper lobe, with dullness, moist inspiratory râles and bronchial breathing. That day she died.

Discussion

BY CHESTER M. JONES, M.D.

This case is of particular interest in that it clearly illustrates the difficulties that occasionally arise in association with antisyphilitic therapy. The patient, a congenital syphilitic with interstitial keratitis, was first treated with arsenic and mercury. During the course of this treatment she developed mercurial poisoning, as evidenced by her stomatitis. That this stomatitis was not similar in character to that later noted on her admission to the hospital is of interest, and indicates that at the onset mercury was the only drug that was not being tolerated. Following the omission of mercury the stomatitis ceased, and ten arsenical injections were given without apparent ill effects. Potassium iodide was apparently responsible for no untoward symptoms, the photophobia and lacrimation noted in September at her first admission to the hospital being probably due to the keratitis.

Her second drug idiosyncrasy appeared following the course of ten arsenical treatments. Unlike the usual type of reaction to arsenic, the patient apparently had no general reactions during this course of arsenical treatment, and when the toxic effect of the drug became evident it was not associated with jaundice. This is of interest inasmuch as by far the most common type of severe arsenic reaction is a toxic hepatitis associated with jaundice. In the case under discussion the toxic effects of the metal were localized in the bone marrow and hematopoietic system, and resulted in a typical aplastic anemia. Due to the depression of marrow function red cells, polynuclear leucocytes and blood platelets were greatly diminished. With a marked reduction in the blood platelets a purpuric condition rapidly developed, with bleeding from mucous membranes. A prolonged bleeding time and the easy formation of hematomata were additional features. Due to

buccal mucous membrane bleeding local sepsis set in, as it usually does, and on superficial examination this mouth infection dominated the picture. Aplasia plus hemorrhage dropped the red count to 3,250,000. Treatment with sodium thiosulphate by mouth apparently brought about rapid elimination of the toxic agent, and was followed by striking improvement in the blood condition. Hemorrhage ceased within four days of admission and the patient was discharged with recommendations for no therapy except potassium iodide for four months.

It is important to note that during her stay in the hospital in September there was no urinary abnormality except for the presence of red cells, due undoubtedly to microscopic bleeding in association with the general purpuric condition. Up to this time there was absolutely no evidence of renal damage.

Resumption of intensive antiluetic treatment took place three months following discharge from the hospital. On this occasion iodobismuth quinine was used—in all twelve injections over a period of as many weeks. At the end of this time renal symptoms became apparent, as evidenced by anuria and increased edema of the eyelids. Suspecting heavy metal poisoning, sodium thiosulphate was again used, but without effect. Urinary findings from now on were those of an acute nephritis similar to those found in mercury poisoning. During about two weeks she became constantly worse, with symptoms and signs of uremia, increased by continuous vomiting. The latter undoubtedly aggravated the existing renal damage due to the great loss of fluid and inorganic salts, base and acid, and treatment by saline and alkali provided only slight relief. The existence of a probable bismuth line on the gums, characterized by diffuse gray punctate dots, seemed to confirm the diagnosis of bismuth poisoning. Death occurred from a terminal infection superimposed on a uremic condition. Necropsy was unfortunately not obtainable.

The chief point of interest in this rather unusual case is the marked idiosyncrasy in a given individual to each of three heavy metals—mercury, arsenic and bismuth—with stomatitis, aplastic anemia and acute nephritis as the resulting clinical manifestations. Of further note is the occurrence of stomatitis due to mercury poisoning and aplastic anemia, respectively, and also of an eye condition characterized by lacrimation and edema, due first to the underlying syphilis and later to nephritic edema. The case presents a very unusual set of clinical manifestations which are individually rather rare, and extremely interesting.

DIAGNOSIS

Congenital syphilis.
Interstitial keratitis.
Acute mercury poisoning with stomatitis.
Acute arsenic poisoning with aplastic anemia.
Acute bismuth poisoning with acute tubular nephritis.
Terminal pneumonia.

CASE 12212

A URINARY PROBLEM IN PREGNANCY

UROLOGICAL DEPARTMENT

A married American woman twenty-eight years old, para iv, entered the Lying-In Hospital October 17, three and a half to five months pregnant. The complaint was ante partum bleeding.

The past history was negative. The three previous pregnancies were uneventful so far as known.

The present illness consisted of bleeding for five weeks, occurring at first at intervals of several days, small in amount. Eight days before admission she had a profuse hemorrhage. She had been bleeding constantly since that time.

Examination on admission was essentially negative except for blood stained labia and uterus enlarged to the size of a five months' pregnancy.

Temperature 99.6°, pulse 94, respiration 20, blood pressure 122/78, hemoglobin 75 per cent., red blood cells 3,837,000. Urine: albumin 0, sugar 0, sediment showed a few epithelial cells.

X-ray showed a fetus compatible with four and a half months' pregnancy.

She was confined to bed, but continued to bleed in small amounts until the night of October 25, when a profuse hemorrhage occurred. Under the conditions it was deemed wise to deliver her. This was done with a Vorhees bag. A premature fetus was delivered spontaneously.

The second day post partum the temperature was 100.2°. The urine showed a very slight trace of albumin, no sugar; sediment 40-50 leucocytes per high power field. The third day, October 28, the temperature was 101° and the patient began to complain of abdominal pain, more marked on the left side, with left costovertebral tenderness involuting normally. The following day, October 29, there was marked costovertebral tenderness on the left.

The patient was cystoscoped October 30, relieving a bladder containing pus in concentrated urine. Urine from right kidney showed rare leucocytes and red blood cells; no bacteria. There was a worm of pus from left ureter. Urine from the left ureter showed 30-40 leucocytes per high power field, cocci in chains, and a few motile bacilli. Neither kidney pelvis was dilated. A solution of silver nitrate was instilled into the left kidney pelvis. An injection of sulpharsenol 120 mgm. was given that day.

During the next four days the patient's temperature rose to 103.6°, the pulse to 120. She

appeared quite sick. On the fourth day a large tender mass could be palpated in the left kidney region.

Operation was done, drainage of a pyonephrotic kidney which was markedly distended with foul smelling pus. Nephrectomy was not done because of the patient's poor condition.

The day following the operation the urinary output fell to fifteen ounces. Under continued forcing of fluids, however, it rose during the next few days to 234 ounces.

Six days after operation the temperature had dropped to 99° and there was much purulent discharge from the drained wound. In the next few days, however, it rose to 101°. There was much tenderness in the left costal margin. There was no pus backed up in the wound. The left chest was suspected and tapped, yielding 650 c.c. of exudate smear from which showed numerous polynuclears. Following the tap the patient felt much relieved. Being obstetrically well she was transferred November 17 to the Massachusetts General Hospital for further care.

The entrance complaint was pain in the left flank and in the left side of the chest, not increased by breathing. The self-retaining catheter was still in place. She thought there was no bleeding from the vagina, and had noticed no discharge at all. There was considerable discharge from the wound in the flank each time the dressing was changed.

Examination showed a well nourished woman with an anxious expression, complaining of pain in the left flank when she moved or talked. Chest expansion was limited on the left side. There was bronchial breathing at the left base, but no dullness or change in tactile fremitus. The heart sounds were distant and of poor quality. In the left flank was a scar extending somewhat more anterior than the usual kidney scar. There was some tenderness, slight spasm, and a mass in the region of the left kidney. The posterior portion of the wound was open and discharged thick foul pus. Rectal examination showed a large uterus with the fundus to the left and slightly tender. The cervix was felt low in the pelvis. Vaginal examination was not done. There was slight edema of the ankles. The pupils and reflexes were normal.

Before operation the urine was alkaline at two of five examinations, specific gravity 1.016 to 1.022, cloudy at three of seven examinations, alkaline at three, the slightest possible trace to a very slight trace of albumin at five, leucocytes at six, loaded at one, many red cells at one. The blood showed 12,000 leucocytes, 60 per cent. polynuclears, hemoglobin 60 to 80 per cent., 4,000,000 to 4,150,000 reds, smear normal. Wassermann negative. Non-protein nitrogen 34 mgm. Renal function: appearance time 12 minutes, thirty-five per cent. in two hours.

At entrance X-ray showed the lower half of the left lung field distinctly dull. The upper border of the area was rather indistinct and faded into the adjacent lung tissue. The lung markings were distinctly increased. The lower portion of the shadow was of increased density and the outline of the diaphragm was not seen. The ribs however could be seen through it. The costophrenic angle was not visible.

Before operation the temperature was 97° to 100.8°, the pulse 60 to 121, the respiration not remarkable except for three rises to 30-33.

The afternoon after admission the catheter was plugged. It then drained well for a few hours. In the evening it came out. The patient voided well and was comfortable. Next day the catheter was replaced and drained well. There was a good deal of leakage of urine and pus through the wound. On the 22nd there was drainage of considerable very foul colon pus. Next day the self-retaining catheter was out. The patient was comfortable and the wound looked better. November 24 X-ray was done. A large amount of gas in the bowel obscured all the left kidney shadow and part of the right. The lower border of the right kidney was visible and appeared to be of the usual size and in the usual position. There were no shadows visible which suggested calculi.

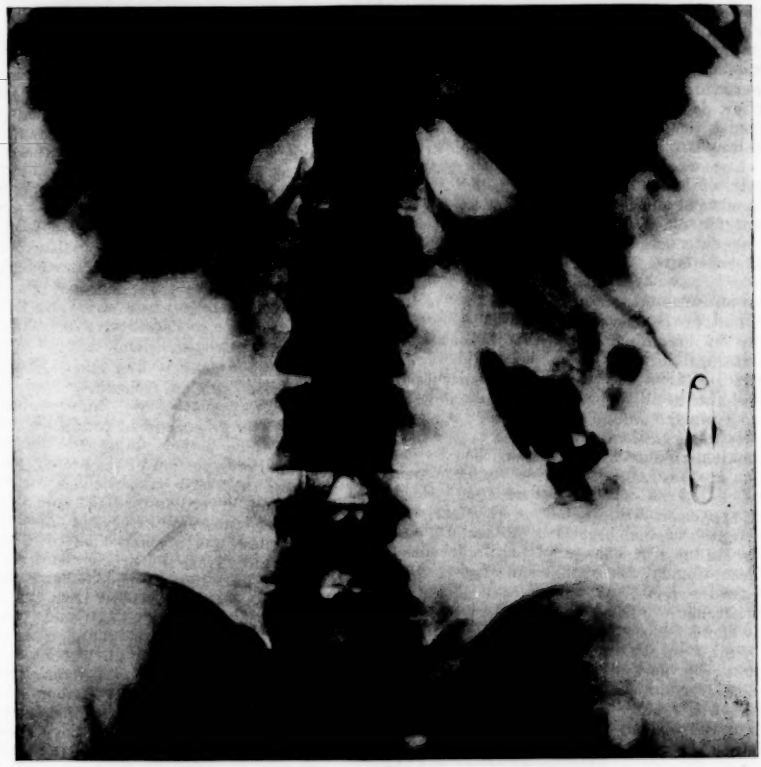
November 25 cystoscopy was done. Next day there was more drainage from the wound. November 27 X-ray showed both kidney outlines obscured by a large amount of gas in the colon. The radiographic catheter appeared to reach well into the lower portion of the kidney pelvis. The course of the ureter was somewhat tortuous, tending to bow inward toward the spine. Just below the left transverse process of the fourth lumbar vertebra was a small area of density running laterally from the ureter about a centimeter, which gave the impression that some of the opaque material had escaped from the ureter. The kidney pelvis was extremely small. On the 27th irrigation of the wound with mercurochrome was stopped. Methylene blue was injected because of the question of double pelvis of the affected kidney. Apparently none of the dye came through in the wound drainage, which was profuse. Analysis of the drainage showed uric acid. Urine tests on the blood and urine were too low to read. X-ray taken after the injection of sodium iodide through the tube in the left side showed the shadow of the injected material lying just below and a little outside the usual position of the kidney. It was very irregular in outline and density. The shape was not characteristic of any organ. December 9 the tube fell out and could not be replaced. A small catheter was put in its place. There was not much pus, but the wound smelt bad.

On December 14 a chest tap gave 20 c.c. of slightly opalescent fluid, specific gravity 1.025, cell count after clotting 3,600 per cubic centimeter, 97 per cent. lymphocytes. The smear

showed occasional Gram-positive diplococci, rare Gram-negative bacilli, not acid-fast. The wound was irrigated with mercurochrome.

December 19 a medical consultant found nothing definite on examination or by X-ray except fluid at the left base.

December 22 operation was done. That night the pulse went up to 160. The patient was put in shock position and next day was much better. She made an uneventful recovery. The profuse purulent discharge from the wound continued the same as before operation. X-ray showed the lower part of the left chest still dull. The outline of the diaphragm was not made out. The intercostal spaces were narrowed. Chest examination January 1 showed nothing but a small area of dullness in left axilla. Breath sounds and fremitus normal. Jan. 3 a medical consultant thought the chest condition clearing. Jan. 7 a second consultant agreed, and found no evidence of tuberculosis of the apices, but thought the chest condition should be carefully reviewed before she was discharged. By Jan. 7 there was very little drainage from the wound. The wound was irrigated with mercurochrome every other day. January 14 the patient was discharged.



Taken December 3, after the injection of sodium iodide through the tube in the left side. Shows the shadow of the injected material lying just below and a little outside the usual position of the kidney. It is very irregular in outline and density. The shape is not characteristic of any organ.

Discussion

BY E. GRANVILLE CRABTREE, M.D.

The antepartum bleeding means I suppose a partly separated placenta, or more probably a placenta praevia.

We must allow of course for the difficulty of getting an accurate past history.

Bleeding for five weeks is some evidence in favor of placenta praevia.

The hemoglobin was seventy-five per cent.,

showing that she had made good her loss of blood to a safe margin.

The urine was a catheter specimen.

The temperature of 100.2° immediately after delivery led the obstetrician to raise the question of sepsis.

This is of course a quick development of a postpartum pyelitis. The difference between post- and antepartum pyelitis, both in the effect upon the patient and in the treatment, is very marked. The question may be brought up as to what effect the early catheterization had in getting a specimen of urine. The answer is, none at all, because postpartum pyelitis may develop in a non-catheterized patient in just the same way. Again, here is a left-sided development of postpartum pyelitis, and in that form as well as in the antepartum form right-sided involvement predominates. That makes us suspicious that all may not have been right in that kidney before pregnancy.

There is another point in consideration of postpartum pregnancy, and that is the prepared field. There is to be expected in pregnant women some back pressure against the kidney and some slight dilatation of the pelvis, which is an ideal field for the quick development of a postpartum pyelitis.

Sulpharsenol has been used quite extensively in treating pelvic infections, and the obstetrician was not convinced up to this point that there was enough in the left kidney to rule out the possibility of pelvic infection.

In the cystoscopy of October 30 there were one or two peculiar things. It was noticed that a worm of pus extruded from the left ureter, yet the sediment obtained from the pelvis of the kidney showed thirty to forty leucocytes. There is some discrepancy there.

The development of a mass which was not there on the day of delivery and which came up practically overnight is typical of acute pyonephrosis developing in a distended kidney in pregnant or postpartum cases. It may appear at any time during the first four weeks following delivery.

A urinary output of two hundred and thirty-four ounces set at ease our doubts regarding the ability of the kidneys to excrete. Fluids had been adequately administered. Forcing of fluids can be done in three ways: (1) by mouth; (2) it is taken up by rectum very easily; we often give three pints; (3) and by subpectoral.

The rest of the history is from the Massachusetts General Hospital records. The patient was well from the obstetrical point of view.

In the report of laboratory findings two things stand out. (1) The intermittent character of the urine, on one occasion quite pussy and on other occasions approaching normal. (2) The function test is a little low. Twelve minutes is a little long, and the total output in two hours of thirty-five per cent. is distinctly low. This is not very important in a case so recently pregnant. Functions in pregnancy are low.

The description refers to a poorly drained pyelonephritic sac. Sooner or later the kidney must be removed. They waited for the patient's condition to improve. It was a good deal to demand of her that she stand a further operative procedure without a chance to rest.

A slight suspicion pointing to the right kidney is the tendency of gas to localize over that side.

I did not do the operation at the Lying-In Hospital. My associate said he found a very large distended kidney pelvis which accounted for the palpable kidney. This he drained.

There was urine escaping from the kidney.

The X-ray report after the injection of sodium iodide brings up the question whether they were injecting a pyogenic sac that had formed around the tube rather than the kidney. As a rule after drainage the kidney will shrink down to quite small size. Pus will leak out from the kidney and form a sac; that is very likely what was draining.

Note that the smear from the chest tap showed the same finding as the urine obtained from the left kidney at the first cystoscopy at the Lying-In Hospital.

PRE-OPERATIVE DIAGNOSIS NOVEMBER 25

Left pyonephrosis.

CYSTOSCOPY

The bladder was slightly reddened, but the vessel markings were present. Both ureters were catheterized and sediments collected. The left ureter could not be made to drain adequately. A function was then done, the right side draining well and a certain amount being recovered from the bladder. The left side was then injected for a pyelogram.

SPLIT RENAL FUNCTION

Right—30 c.c.—40 per cent. diluted to 250 c.c.
Bladder—20 c.c.—15 per cent. diluted to 250 c.c.
Right sediment—oxalates; 6-8 epithelial cells and red blood cells; rare leucocytes; no bacteria.

FURTHER DISCUSSION

To recapitulate: The outstanding things are that a woman with a non-infected urine and without antepartum symptoms was delivered by bagging with a Vorhees bag because of persistent hemorrhage, and immediately after that operative procedure developed a postpartum pyelitis. At a first cystoscopy no evidence of a pyelonephritic sac or of a dilated kidney was obtained. The only outstanding feature of that cystoscopy was that on inspecting the bladder a worm of pus was seen to pass from the ureter,

but the urine drained from the left ureter contained only thirty to forty white cells per field. In other words, was there a source of pus draining into that kidney other than from the pelvis, which was being drained by catheter. This suggests double pelvis with catheter draining the least infected pelvis.

After delivery a mass in the position of the left kidney suddenly developed accompanied by an effusion in the chest on the same side. This complication is occasionally encountered. On tapping fluid in the chest was removed. The patient was bridged over her acute pyonephrosis by an operation of necessity which she was able to tolerate when she would not have tolerated nephrectomy. The result of investigation by cystoscopy and pyelogram has been to show a small pelvis. That is not consistent with the operative findings at the Lying-In.

In other words, we have a good many discrepancies here in a condition which clearly at one time was an acute pyonephrosis. The possible solutions are: (1) that there has been perforation of the kidney or the ureter from some other organ such as the intestine. We have no intestinal evidence of that nature. (2) The second possibility is that we have not found the whole of the kidney. From the shape of the pyelogram one can determine whether we are injecting half of a double kidney. More than that, it is not uncommon to have a kidney pelvis in which one half drains well, the other poorly; one becomes hydronephrotic, the other remaining normal. From the evidence available the best diagnosis is the commoner of the conditions, i.e., double pelvis, of which I catheterized one half at the Lying-In Hospital at the first cystoscopy, and the other half had not been reached. That would explain also the discrepancy seen between the urine obtained from the kidney pelvis at the Lying-In and the thick urine seen to come from the ureter.

PRE-OPERATIVE DIAGNOSIS DECEMBER 22

Pyonephrosis.

OPERATION

Incision in the line of the previous incision, with excision of skin sinus. The kidney was easily exposed. It was found to be densely adherent to its surroundings. The lower portion was thin, friable and large, whereas the upper portion was essentially normal in consistency and appearance. What appeared to be the ureter was divided just below the kidney and found to be much thickened. The kidney was removed without incident. On splitting the organ it was found that the upper portion was about one-third the size of a normal kidney and grossly normal in appearance. The lower portion was thin, soft, and of dark color. On splitting the organ the upper portion revealed a small, normal looking pelvis corresponding to that seen in the pyelogram; the lower portion showed very marked pyonephrosis, corresponding to that seen in another pyelogram. The two portions of the kidney were united by dense kidney tissue, but so far as could be made out the two pelves did not communicate. The upper pelvis had a small but normal looking ureter; the lower had a thickened and much dilated ureter.

FURTHER DISCUSSION

DR. RICHARDSON: I understood you to say that this kidney was after this fashion: there was a pelvis in the region of the upper pole and one in the region of the lower pole with a ureter from each pelvis joining just below the kidney to form one ureter.

DR. CRABTREE: I never saw this kidney and I never saw the pyelogram, but that is what I think they mean. The ureters united close to the kidney.

PATHOLOGICAL REPORT

Left kidney. The kidney is six and a quarter inches long and has inflammatory perinephric fat adherent. On section the pelvis and calices are dilated and form intercommunicating pockets. The fat of the sinus is increased.

Microscopic examination shows the walls of the pelvis infiltrated with wandering cells. There is no evidence of tuberculosis.

Pyonephrosis.

FURTHER DISCUSSION

DR. CRABTREE: It does not seem to me that he is describing all that is described here. Dr. Meigs, who did the operation, said he came down upon what appeared to be an irregular kidney quite distended with pussy urine.

A PHYSICIAN: Was it determined what that shadow was that did not seem to be in the kidney?

DR. CRABTREE: The record says, "The shadow of the material injected lying just below and a little outside the usual position of the kidney . . . is very irregular. . . . The shape is not characteristic of any organ." On November 25, "The course of the ureter was somewhat tortuous, tending to bow inward toward the spine." That could come from pressure, if the lower segment of the kidney was the dilated portion.

No one has yet in that pyelogram found where the second pelvis entered the ureter, and it might have been that the escape from the ureter was here and that that was the place at which a little of the fluid went into an already blocked pelvis. Sometimes we have to do two or three pyelograms before we can find the second pelvis, where the ureter is a Y.

DR. YOUNG: Do you suppose they took two

pictures, injecting as they pulled the catheter out? I think that is very well worth while.

DR. CRABTREE: I think so too, but in some cases even that will not fill the second pelvis. Usually if we plug the ureter with a large catheter, then inject, it will get both pelves.

DIAGNOSIS

Pyonephrosis, left.

CASE 12213

A PROBLEM IN PELVIC SURGERY WITH UNEXPECTED FINDINGS

SURGICAL DEPARTMENT

An American woman of forty-two, married, entered August 10 through the Emergency Ward complaining of pain in the right lower and midportions of the abdomen. Her family and past history were not obtained.

Two years before admission she noticed a freely movable lump the size of a hen's egg in the right lower quadrant or midline of the lower abdomen when she stood up, shifting to the right side when she lay down. It felt firm, was not tender, and gave no trouble at that time. It slowly increased in size. Eleven months ago and again five months ago she had attacks of pain like the present one but lasting only one or two hours. The mass had grown to the size of a baby's head. She now had a painful dragging-down feeling in the pelvis all the time, and the lump felt tender.

At seven o'clock the evening of admission on stooping over she felt knife-like pain in the lower abdomen. She lay down. Nevertheless the pain kept increasing in severity until it became unbearable. A physician gave morphia. The pain was constant, knife-like, non-radiating, localized to the lower abdomen in the midline and the right lower quadrant. She had had no gastro-intestinal or cardio-respiratory signs or symptoms. Her menstrual history was negative. She had no genito-urinary history.

Examination showed a healthy looking woman with a tendency to obesity, lying fairly comfortably in bed. Examination was negative except for the abdomen. In the lower portion in the midline and to the right was a firm, rather resilient feeling mass, freely movable, very tender, causing voluntary spasm of the rectus muscles. There was flowing of a slight amount of dark liquid blood with no clots. Vaginal examination was not done. By rectal examination the cervix could not be felt. In the posterior cul-de-sac a large firm very tender mass could be felt extending from the midline over toward the right, rather freely movable.

There is no record of the urine before operation, which was done the day of admission. The leucocyte count was 17,800, the temperature 100°, the pulse 120, the respiration 22. The patient made a good operative recovery and a very good convalescence. At discharge she complained of some tenderness on each side of the scar. The temperature was normal and there was no evidence of abscess. She was discharged relieved August 26.

DISCUSSION

BY ERNEST M. DALAND, M.D.

Here is a woman of forty-two coming into the Emergency Ward at night, for pain. She had noticed a freely movable lump in the right lower quadrant. That is significant in an obese woman. A tumor mass was present large enough for her to feel when she lay down. Apparently, at seven o'clock, while she was stooping over, something happened, because she had no symptoms up to that time, and her pain after that was extremely severe, enough to require morphia.

Vaginal examination was not done in the Emergency Ward but was done at operation under an anesthetic.

As I remember it the urine was negative.

The differential diagnosis has certainly to do with a tumor mass in the pelvis. The tumors that we should think of in the right lower quadrant or in the midline are fibroids of the uterus, tumors of the ovary, and cysts of the ovary. Her history is not suggestive of anything in the urinary tract or in the gastro-intestinal tract. It is not a story of appendicitis. It is not a story of stone in the ureter. The fact that there was some flowing would make an ectopic pregnancy a possibility. But she had previous attacks which cleared up within a very short time, within a few minutes, and they did not turn out to be ectopics. Had she had any children?

MISS PAINTER: No family history was obtained.

DR. DALAND: Vaginal examination was done under the anesthetic and it showed the uterus to be well pulled up into the pelvis, the cervix just palpable, not soft and not remarkable. There was a mass in the posterior cul-de-sac. But on rectal examination this mass, which was felt both on rectal and pelvic examination, was definitely tender.

DR. YOUNG: Was that the mass that was apparently causing the trouble?

DR. DALAND: Yes. The leucocyte count might be due to infection or it might be due to some other form of peritoneal irritation. In ectopic pregnancy if there is much free blood in the abdomen we do get a high white count. If the blood is walled off or with a very small amount of blood, we ordinarily get a normal white count or one of ten to twelve thousand. I think this means probably a peritoneal irritation of some sort, possibly acute bleeding, although she showed no sign of it.

DR. YOUNG: Don't you think an acute bleeding generally gives more of a white count than that? A sudden real hemorrhage will give over 25,000 as a rule.

DR. DALAND: Farrar of New York has done a lot of blood work on ectopic pregnancies. In 48 per cent. of 150 cases there was a normal leucocyte count. It was normal in 43 cases of ruptured pregnancy in which the blood was walled in. Where there was old blood present or where there was slight bleeding the count varied from 10,000 to 16,000. Where bleeding was massive the count ran up to 21,000, but rarely above that.

DR. YOUNG: That surprises me, because I thought the white count in acute hemorrhages was generally pretty well up.

DR. DALAND: There was one up to 30,000.

A diagnosis of ovarian cyst with a twisted pedicle was made, although that did not explain the high white count. Because of the acute onset, because of the fact that the mass had been palpable for a number of years, because she had had previous attacks, it seemed as if it were a non-infectious process.

DR. YOUNG: Why not a pedicled fibroid with a twist?

DR. DALAND: Of just the fibroid itself?

DR. YOUNG: Yes.

PRE-OPERATIVE DIAGNOSIS

Ovarian cyst with twisted pedicle.

OPERATION

Gas-ether. Median incision. When the abdomen was opened a large amount of fresh blood with clots was found in the peritoneal cavity. At the upper pole of the fundus there was a bleeding point from which a large quantity of venous blood was flowing. As the uterus was lifted from the wound it rotated through an arc of 180 degrees. It was about the size of a six months' pregnancy and was filled with fibroids. The vessels were clamped, the peritoneum was stripped off and the uterus was removed supravaginally. The peritoneal flaps were closed. The tubes were large and cystic. The ovaries were normal. Neither the tubes nor the ovaries were removed. The abdomen was closed in layers without drainage.

PATHOLOGICAL REPORT

A nodular uterus the size of a cantaloupe amputated through the cervix. The walls contain several spherical fibrous tumors the largest of which is 13 cm. in diameter. The uterine cavity is slightly dilated and the endometrium is smooth.

Microscopic examination of the largest tumor shows a structure of interlacing bundles of smooth muscle cells which are separated by bands of connective tissue.

Multiple fibromyomas.

FURTHER DISCUSSION

On one side of the uterus was a big nodular fibroid which stuck out from the rest and which was apparently the cause of all the trouble.

When the abdomen was opened there was a bleeding vessel at the fundus that was a steady flow, the blood coming up from the fundus about half an inch, as if a faucet had been opened. We were rather puzzled to see the reason for that and were lifting the uterus up into the wound when the uterus turned around 180 degrees. The woman had had this fibroid uterus for some time. The mass the size of a hen's egg that she had felt was this mass sticking out to the left, and when she stooped over she caught that fibroid behind her pubes and the symptoms began.

She had some congestion with vaginal flowing at the start, but as the venous circulation got shut off there was no further vaginal bleeding, and it had to rupture through a vessel into the abdomen.

DR. YOUNG: Have you ever seen a twisted uterus before?

DR. DALAND: No. I have read a report of one since then.

DR. YOUNG: I never have. I have seen a twisted ovary and tube, but never the whole uterus.

DR. DALAND: We get torsion of the uterus in pregnancy occasionally, but I have never heard of any other.

DIAGNOSIS

Multiple fibromyomas with torsion of the uterus and hemorrhage.

"WILD YOUTH" IS NOT SO WILD

URGING the need of National statistics on juvenile delinquency, the Children's Bureau made public recently a statement summarizing what official figures there are on this subject. These show, contrary to widely published statements, a downward trend in juvenile delinquency rates in large cities. Census reports covering the whole country indicate also, the Bureau found, "no significant increase" in the number of children committed to institutions for the more serious offenses—homicide, robbery, burglary.

Of the 14 cities—New York, Boston, Buffalo, Chicago, New Orleans, Providence, Richmond, St. Louis, Washington, D. C., Rochester, Detroit, Minneapolis, Philadelphia, and Seattle, for juvenile court statistics, decreased delinquency which the Children's Bureau was able to secure rates were found in the first named nine cities. —*Weekly Notes on Child Welfare Topics Compiled by the U. S. Children's Bureau.*

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THE NURSING PROBLEM

THE resolutions appearing in the report of the Reference Committee on Medical Education before the House of Delegates of the American Medical Association relative to the education of nurses will be read with the well nigh unanimous approval of the medical profession. From all over the country appeals have been made for more nurses who may be ready to take care of the sick in their homes. The nursing profession has apparently adopted the trend of present day methods in vogue in medical education and has nurtured the ambition of educators of nurses to make the curriculum of the training schools so elaborate that the graduates are led to regard nursing as a definite form of medical practice.

This appears at times in the freedom with which nurses give opinions on medical matters and even seem to modify the treatment of patients. Physicians want more nurses who will be content to follow instructions and take good care of patients without seeming to be controlled by an overwhelming sense of dignity and an inelastic adaptability to the complexities of household requirements.

The solution of the existing shortage of nurses offered by nurses is that sick people must learn to go to hospitals unless able to meet the expense of hiring nurses. Here again the person of moderate means often finds the expense of hospital treatment almost prohibitive if continued for any length of time. It should be said in justice to hospitals and doctors that efforts are being made in many places to provide for less expensive hospital accommodations but the time may be far distant when people who do not need the most expert care will generally adopt hospitalization. Practically everybody has come to understand that hospitals are essentials in dealing with many of the ills of mankind but it is equally well understood that many comparatively less serious troubles can be managed quite well, and with more satisfaction on the part of the patient, in the home. This is often so in long continued sickness.

The whole problem is certainly very complex and involves many angles because we want the nurse to be efficient, agreeable and modest and a person who has such fundamental qualifications and who has been even moderately well and can charge fees which will be more satisfactory for herself than for many of her patients.

If the resolution submitted by the Reference Committee on Education can be generally adopted and put into operation, great satisfaction will result. We are somewhat skeptical because control of the education of nurses seems to have been brought about by the nurses' organization. Doctors and hospitals have far less influence with respect to these matters than existed twenty-five years ago. The tendency is toward specialization in nursing almost as much as in medicine and the nursing profession seems to be in control of the situation.

With the more general commercialization of medicine, what can we expect of nursing?

ART AND SCIENCE IN THE INTERPRETATION OF TECHNICAL FINDINGS

THE fact that papers are still presented before medical societies dealing with the difficulties of diagnosis, and particularly of X-ray diagnosis in diseases of bone and joint, shows that there is not yet a clear understanding that there are no absolutely definite appearances in particular lesions. The X-ray portrays simply reactions to stimuli which may be bacterial, chemical or traumatic in character.

It is perfectly true that most diseases present fairly definite appearances. But this is true because a typical lesion ordinarily follows a farily definite course. The nature, the severity and the duration of the stimulus and the resistance of the individual, as well as the stage in the development of the reaction, are the factors which determine the appearances in the X-rays.

More and more must surgeons train themselves to interpret X-ray appearances, consulting freely with the roentgenologist, because the latter has the opportunity of studying more

plates than any individual surgeon. And conversely, the roentgenologist before interpreting his plates must demand the history and the clinical findings, as well as checking of opinions by actual operative or autopsy findings.

The sooner every physician and surgeon, every medical student and every teacher recognizes that the laboratory is the aid of the clinician and that laboratory findings of every kind are to be interpreted only in the light of full and accurate clinical histories and complete and careful physical examinations, the sooner will truly scientific medicine assume the place in public esteem to which it is entitled. The art of medicine has never neglected the individual. The science of medicine must do likewise.

ATTENDANCE AT MEDICAL MEETINGS

The reported attendance of members of The New York State Medical Society at its recent annual meeting was 1229. There are nearly eleven thousand members of this Society and therefore only about one in eight attended the annual meeting. If this is the average ratio, we would expect about five hundred members of Massachusetts Medical Society to convene in Springfield in June. We hope that the number will be so large that the hospitality of the City will be taxed to its utmost.

Present indications warrant the expectation that we are to have one of the most successful meetings in the history of the Massachusetts Medical Society. Members should be making plans to attend.

THE ADVANTAGE OF HAVING A COMMITTEE ON RESOLUTIONS

The by-laws of the Massachusetts Medical Society make no special provision for a Committee on Resolutions nor is there any provision that a copy or even notice of any proposed resolution be given before the meeting at which it is to be introduced.

The result is that frequently under the last item of incidental business, when everybody is anxious to be through, a resolution may be introduced involving an expression of opinion upon a controversial topic or proposing a departure from previous practice. The resolution may be one meeting with almost unanimous approval, yet the wording may be ambiguous, or involve matters not intended to be included, or omit important matters. Under any circumstances it is essential that resolutions should have adequate study.

If a Committee on Resolutions should be created it would place great power in the hands of its members in shaping matters of policy. Reference to special committees appointed to consider particular resolutions would enable the Society to utilize the services of those best qualified to deal with the points at issue. In any case, it is desirable that resolutions which any member of the Society plans to introduce at either the meeting of the Society or of the Council should be given to the Secretary in time to be included in the program of business. If this is done, such matters would receive intelligent and thoughtful consideration and be disposed of promptly or referred to a committee after debate which would be helpful in bringing out divergent views.

MR. FORD TOWS US HOME

Henry Ford has said it. If we may believe the *Transcript*, Mr. Ford, when asked to contrast the returns of the physician with the income of the industrial captain, "declared it to be his conviction that the doctors are on the wrong track today.

"'If the doctors would invent something,' he said, 'to prevent people from being sick they would get so much money that they would not know what to do with it. I don't think the doctors have waked up yet.'

"The thought Mr. Ford laid as a basis for this assertion was that they are working on medicines to prevent illness when they might be teaching the people how to live so as to keep well."

Thus spoke the great automobile manufacturer, who, through his invention, is responsible for more aching backs and jumping nerves than any other man in the world. He does not appear to realize that whenever a doctor develops a serum or a vaccine which prevents disease, he turns it over to the profession at large, and promptly loses all personal benefits except occasionally that of having his name attached to it. If his discovery proves to be of value, the state health departments take it up and distribute it free of charge. One difference between manufacturing a patented product and conducting medical research is that in the case of the former, the originator retains control of his product, whereas the discoverer of a new fact in science gets his reward only from the satisfaction which comes to him from having added to the sum total of knowledge.

As for "teaching the people how to live so as to keep well," we doubt if mankind will ever be sufficiently impressed by our labors in that direction to turn over to us incomes even one-thousandth as large as that of Mr. Ford. One difficulty exists in this, that every individual feels convinced that he himself will never suffer from any of the pathological conditions against which he is being warned. It is only when a man finds himself actually sick that he is willing to part with his money to be made well.

Nevertheless, even though we cannot think Mr. Ford has really pointed out the way for us

to slough off all our financial cares, we must give him credit for having acted with the same altruism that activates the medical man when, by discovering a new method to prevent disease, he cuts down the number of his future patients. For by showing us how to become rich, Mr. Ford would enable us all to sell our flivvers and purchase Rolls-Royces; if the doctors were to stop driving Ford cars, the great manufacturer would surely have to go into bankruptcy.

THIS WEEK'S ISSUE

CONTAINS articles by the following named authors:

DENORMANDIE, ROBERT L., A.B., M.D. Harvard Medical School 1902; F.A.C.S.; Instructor in Obstetrics, Harvard Medical School; Assistant Visiting Obstetrician, Boston Lying-in Hospital; Obstetrician, Massachusetts Women's Hospital. His subject is "Three Common Causes of Maternal Mortality," page 963. His address is 355 Marlborough St., Boston.

FREMONT-SMITH, MAURICE, A.B., M.D. Harvard Medical School 1918; Assistant in Medicine, Harvard Medical School; Junior Visiting Physician, Boston City Hospital. His subject is "The Eye and the Internist," page 968. His address is 99 Commonwealth Ave., Boston, Mass.

MADDOCK, STEPHEN J., M.D., House Officer in the Long Island College Hospital, Brooklyn, N. Y., and

WHITAKER, LESTER R., A.B.; M.D. Harvard Medical School 1923; Formerly Arthur Tracy Cabot Fellow in the Harvard Medical School. Now Assistant Resident Surgeon, Peter Bent Brigham Hospital. Their subject is "Effects of Sodium Tetraiodophenolphthalein in Complete Biliary Obstruction," page 973. Address Dr. Whitaker, Peter Bent Brigham Hospital.

CAMP, JOHN D., S.B.; Ch.B.; M.D. Boston University School of Medicine 1922; Assistant Roentgenologist, Massachusetts General Hospital; Associate Editor of "Radiology"; Member of Association of Resident and Ex-Resident Physicians of the Mayo Clinic. His address is Massachusetts General Hospital, Boston, Mass. Associated with him are Drs. Robert Reeves, and Henry Field, Jr. Dr. Reeves received his M.D. degree from Baylor University in 1924 and Dr. Field received his M.D. degree from the Harvard Medical School in 1920. The subject of their paper is "Experiences with Cholecystography," page 976.

POWELL, WILSON, B.A.; M.D. Faculty of Medicine, Queen's University, Kingston, Ont., 1924; Formerly Assistant Medical Adviser, Industrial Insurance Commission, Olympia, Washington. Now Resident Physician, Children's Community Centre, New Haven, Conn., and Visiting Physician, New Haven Dispensary. His subject is "Acrodynia," page 980. His address is 1400 Whitney Ave., New Haven, Conn.

LYTHGOE, HERMANN C.; S.B. Massachusetts Institute of Technology; Member, American Chemical Society; Fellow, American Association for the Advancement of Science; Director of the Division of Food and Drugs in the Department of Public Health of Massachusetts. His subject is "The Copper Content of Distilled Liquor on Sale in Massachusetts," page 984. Miss Blanchie O. Berry, S.B. Boston University, and Mr. Sydney H. Hall, A.B. Harvard University, were associated with Mr. Lythgoe in this study.

LOMBARD, HERBERT L.; A.B.; M.D. Bowdoin Medical School 1915; M.P.H. Harvard School of Public Health, and

DOERING, CARL RUPP, A.B., C.P.H., D.Sc.; M.D. Baylor University College of Medicine 1921; Instructor in Vital Statistics, Harvard School of Public Health. They write on "The Difficulties Met with in the Interpretation of Trends of Cancer Mortality," page 988.

LEGISLATIVE NOTE

STATE POLICY RELATIVE TO THE CANCER PROBLEM

FACTS recognized by intelligent people with respect to the cancer scourge together with appeals by organizations have led the state to pay definite attention to its responsibilities in dealing with this serious menace. The legislature in trying to meet the demand which exists for some definite disposal of the problem is now dealing with a substitute bill.

The State Commissioner of Public Health had advised the Legislative Committee that further study is needed before embarking on a large scheme and spending large sums of money which might not be necessary because of the facts that all well equipped hospitals are meeting known surgical indications and special study is being given to the factors entering into the treatment of the disease, so that the burden to be assumed by the State may not be so large as is feared by some. It must be kept in mind that many of the long continued cases of cancer will continue to prefer to be at home, if conditions admit, after the resources of special treatment have been exhausted.

Representative Shattuck presented cogent arguments against the size of the appropriation as specified in House bill 1500 but the legislature was evidently convinced in this early consideration that the situation must be met in a large way. The substitute bill which is reproduced below will follow to a large extent the advice of the commissioner of Public Health.

MASSACHUSETTS 1926

SENATE No. 398—SUBSTITUTED FOR HOUSE 1500

AN ACT to promote the prevention and cure of cancer and the extension of resources for its care and treatment.

Whereas, it is important for the protection of the public health that immediate steps be taken to promote the prevention of cancer and the cure and treatment of persons afflicted with cancer, therefore this act is hereby declared to be an emergency law, necessary for the immediate preservation of the public health.

SECTION 1. The department of public health is hereby authorized and directed to formulate plans for proper hospitalization for the cure and treatment of persons suffering from cancer, with a view to taking the necessary initial steps toward the establishment of necessary hospital facilities for such care and treatment by the construction of new hospital buildings, use of existing buildings, or by additions to existing buildings, or both. The department shall, from time to time, submit such plans to the governor and council and to the budget commissioner, and shall report final plans to the general court not later than the fifteenth day of October in the current year, with drafts of such legislation as may be necessary to carry the same into effect, and shall at the same time file copies thereof with the said budget commissioner.

SECTION 2. The department shall establish and organize in such parts of the commonwealth as it may deem most advantageous to the public health, cancer clinics and shall conduct the same with or without co-operation on the part of municipalities, local physicians and other agencies.

SECTION 3. Subject to appropriation, the department may expend during the current fiscal year for the purposes of this act a sum not exceeding fifty thousand dollars.

MISCELLANY

OFFICERS FOR MIDDLESEX EAST MEDICAL SOCIETY

PRESIDENT—Dr. Ralph R. Stratton, Melrose.

Vice-President—Dr. Thomas E. Caulfield, Woburn.

Secretary—Dr. Allan R. Cunningham, Winchester.

Treasurer—Dr. Richard Dutton, Wakefield.

Censors—Drs. A. E. Small, Sup., Melrose; H. A. Gale, Frederick O. West, Joseph H. Kerrigan, Charles E. Montague.

Councillors—Drs. C. R. Henderson, Nom.; A. E. Small, Alt.; Richard Dutton, George F. Dow, Ernest S. Jack.

Commissioner of Trials—Daniel T. Buzzell.

Librarian—George W. Nickerson.

Auditor—C. W. Harlow.

ALLAN P. CUNNINGHAM, *Secretary*.

WEEKLY HEALTH INDEX

TELEGRAPHIC returns from 69 cities with a total population of twenty-nine million for the week ending May 1 indicate a mortality rate of 14.4 as against 13.7 for the corresponding week of last year.

The annual rate for 69 cities is 16.1 for the eighteen weeks of 1926, against a rate of 14.4 for the corresponding weeks of 1925.

OFFICERS ELECTED AT THE ANNUAL MEETING OF THE ESSEX NORTH DISTRICT MEDICAL SOCIETY MAY 12

PRESIDENT, Roy V. Baketet, Methuen; Vice-President, Adelbert M. Hubbell, Haverhill; Secretary, J. Forrest Burnham, Lawrence; Treasurer, Edw. H. Ganley, Methuen; Auditor, Thos. W. Murphy, Lawrence; Censors: Supervisor, Fred S. Smith, No. Andover; John E. Bryant, Haverhill; Edw. P. Laskey, Haverhill; Roland L. Toppan, Newburyport; Chas. J. Burgess, Lawrence; Councilors: Elmer S. Bagnall, Groveland; J. Forrest Burnham, Lawrence; Frank W. Coffin, Haverhill; Wm. W. Ferrin, Haverhill; T. Raymond Healy, Newburyport; Gustav E. Kurth, Lawrence; Fred S. Smith, No. Andover; Frank W. Snow, Newburyport; W. Dacre Walker, Andover; Commissioner on Trials, Israel J. Clarke, Haverhill; Nominating Councilor, T. Raymond Healy, Newburyport; Alternate Nominating Councilor, Fred S. Smith, No. Andover; Committee on Funds, Granville S. Allen, Lawrence; Geo. B. Sargent, Lawrence; Frank B. Pierce, Haverhill; Correspondent to BOSTON MEDICAL AND SURGICAL JOURNAL, J. Forrest Burnham, Lawrence.

THE ABUSE OF CHILD LABOR

CHILDREN under 16 years of age play an important part in the production of tobacco in the United States, two of the most tedious and disagreeable operations in its cultivation, suckering and worming, being considered in some tobacco growing areas distinctly children's work, according to a report made public May 18 by the Children's Bureau of the U. S. Department of Labor.

In the typical districts chosen for the study, 2,278 child workers were found and interviewed, 563 in Kentucky, 606 in South Carolina and Virginia, and 1,109 in the Connecticut Valley.

Nearly one-half of these children in the South and more than one-third in New England were under 12 years, and about one-fifth in the South and more than one-tenth in the Connecticut Valley were under 10 years of age. About one-third of the children included in the study were girls. Negroes constituted about one-third of the child workers in Kentucky, and about one-fourth of those in South Carolina and Virginia. In the Connecticut Valley almost all were white, but of foreign parentage.

Because a great deal of the work necessary in tobacco cultivation is done by hand and requires watchfulness and care rather than physical strength, children assist in every process, the older children in planting, topping, and harvesting, and children of all ages, even under 8 years, in suckering and worming. Suckering and worming is particularly the task of children in the South, little suckering and no worm-

ing being reported by child workers in the Connecticut Valley.

Suckering must be done two or three or even four times in a season, and in the hottest months of the year. It consists of breaking off the suckers or side branches that develop in the axils of the leaves after the top of the plant has been broken off to force the growth into the leaves. The children complain that their backs ache from bending over the plants, that pulling off the suckers hurts their hands and that the strong odor from the tobacco makes them ill.

Worming is done at the same time as suckering, or before. The worker must examine each leaf carefully on both sides and remove any worms found, destroying them with a twist of the thumb and forefinger or putting them in a tin can or other receptacle to be burned later. This work is so disagreeable, and according to some workers so irritating to the skin, that premiums are occasionally offered for it or the children are threatened with severe punishment if any worms are found on the plants after the work is finished.

The necessity for hand worming has been decreased to some extent by using arsenate of lead as a spray, by taking extra care of the ground before the plants are set out, and by allowing fowls, especially turkeys, to enter the field. But on the whole the amount of hand labor necessary in tobacco cultivation has been but slightly reduced by the application of principles of scientific farming and by the use of machinery. Suckering, according to the U. S. Department of Agriculture, can be largely avoided by the selection of strains of tobacco that have little tendency to produce suckers. That department also calls attention to the "general inefficiency" of hand worming and the success which has followed the use of arsenate of lead as an insecticide.

Tobacco growing in Massachusetts and Connecticut, three-fourths of the acreage being in the vicinity of Hartford, is a large commercial enterprise and many of the tobacco farms are owned by corporations. Two types of tobacco are produced, shade-grown and sun-grown, most of the city children who go out to work being employed for the picking of shade-grown tobacco. Rural children are employed on both crops. The majority of the city children began work at 7 a. m. and worked until 5 p. m., the additional hours consumed in transportation making a very long day.—*U. S. Department of Labor, Children's Bureau, Washington.*

RECENT DEATH

NICHOLS—Dr. Alvord Gates Nichols died at the Peter Bent Brigham Hospital, Roxbury, May 18, 1926, aged 32, of pyle phlebitis.

Dr. Nichols was a Fellow of the Massachusetts Medical Society and assistant medical director of the John Hancock Life Insurance Company for the last two years. His death followed an operation two weeks ago.

Born in Burma, son of a missionary, Dr. Nichols was graduated from Colgate University in 1916 and from Harvard Medical School in 1922. He was formerly connected with the Out-Patient Department of the Peter Bent Brigham Hospital, and before that was house officer of the Worcester City Hospital. He joined the Massachusetts Medical Society in 1922.

In 1922 he married Marguerite E. Faust, daughter of Mr. and Mrs. Oliver C. Faust, who survives.

A Personal Tribute

His death is mourned by a host of friends, who knew his probity, his sympathetic cheerfulness, his ability and his promise.

Robert W. Buck.

OBITUARIES

EDWARD HICKLING BRADFORD
1848-1926

Edward H. Bradford was no ordinary man. A direct descendant of Governor William Bradford he was of undiluted New England stock. He was by right a Pilgrim rather than a Puritan, ruled by the highest personal standards, but tolerant and charitable as regards the rights and opinions of others. He was quite devoid of grimness, so often associated with a defective sense of humor—highly developed in him—and a quality we are more apt to connect with the Puritan than the Pilgrim.

Born in '48, he won his A.B. at Harvard in '69, his M.D. in '73 after a year's interneship at the Massachusetts General Hospital. Then came two years of serious study in Vienna, Berlin, Strasburg and other transatlantic foci.

At first entering general practice, he soon saw the possibilities of orthopedic surgery and studied under Taylor of New York. Steadily he forged ahead. His relations with Dr. Buckminster Brown, then the leader in orthopedic surgery in New England, were thoroughly cordial, and Bradford seuceeded him at the House of the Good Samaritan, the first and then only institution here to make special provision for children afflicted with joint disease. But he saw clearly that at that time, at least, orthopedic must be based on general surgery. Specialism with him was a natural, not a hot-house, product. In 1880 he was appointed Surgeon to Out Patients at the City Hospital, later becoming Full Surgeon, and resigning only when work at the Children's Hospital, teaching and private practice absorbed even his energy and time. As Surgeon at the Children's Hospital he kept in close touch with general surgery. Finally, he there became Surgeon in Chief. In 1881 as Assistant in Surgery in the Harvard Medical School, orthopedic teaching was entrusted to him. Later he became the first Professor of Orthopedic Surgery, filling the chair endowed by a bequest of Dr. Buckminster Brown and bearing his name. In 1890 he and Lovett published their nota-

ble Treatise on Orthopedic Surgery which went through five editions. He was Dean of the Faculty of Medicine from 1912 to 1918, and during the late war shouldered also the arduous task of service on the Board of Draft Appeal for Selective Service. He was the moving spirit in the founding of the School for Crippled Children in 1894, the first school of its kind in this country, and chief promoter of its growth. The story of this School is one by itself, and is promised by one more competent than I. He rendered valuable service on the Athletic Committee of Harvard College. From 1919 to '25 he was an Overseer of Harvard, his opinion carrying weight in general as well as in medical questions. I omit membership in professional and scientific societies, and smaller details. These things are of minor importance save in so far as they indicate the rating of a man. They very imperfectly reveal the man himself. This difficult task is foreshadowed in my opening paragraph.

Integrity; moral and mental, each high in degree, were rarely blended in him—an honest man may not have an honest mind, and *vice versa;* courage; capacity for and devotion to work; fairness, constancy in friendship: these were outstanding qualities commanding deep respect and affection. In him the *mens sana* and *corpus sanum* were happily married. Except during a typhoid fever he was never in bed a day in his life. He took the sovereign remedy, hard work, steadily and in full doses. His career confirmed the truth of Sir Andrew Clark's saying,—"Work is the life of life." His extreme shortsightedness may have prevented him from playing games; but in social life he was a shining light. His mind was comprehensive, as were his interests. Perhaps no better illustration of his quality can be given than the fact that, when nearing seventy-five, failing sight led him to learn to read Braille print. In that he made such progress as enabled him to get much pleasure and occupation. He also taught himself to use the typewriter by touch. His blindness had some unusually troublesome features. There was no self-pity. Here it may be added that when many years ago a bicycle accident cost him an eye and facial disfigurement he remarked to a visiting friend,—"I don't want any sympathy. Call me a damned fool if you like." When he spoke of his infirmity he did so objectively, with underlying humor. He dominated his blindness, and in spite of it led his life as a lesser man could not do; keenly, joyously interested in a wide range of activities, past, present and future.

He is survived by his wife and, fortunately for the world, four children who promise to carry along their precious inheritance.

F. C. S.

RESOLUTIONS ON THE DEATH OF DR. FREDERIC B. M. CADY

Whereas: By the death of Dr. Frederic Benjamin Mooers Cady the Boston Society of Psychiatry and Neurology has sustained the loss of one of its members active in the Society since 1920, and

Whereas: Until recently Dr. Cady has been in the practice of neurology and psychiatry in our midst, it is fitting that proper notice should be taken of our loss. Dr. Cady was born in Cooperstown, N. Y., in 1881. He graduated from Harvard in 1903 and from Harvard Medical School in 1907, since which time he maintained an office in Cambridge. He began the study of psychiatry at the McLean Hospital and for twelve years was assistant to the Neurological Department at the Massachusetts General Hospital. During the war he served in the Medical Corps of the Army. For many years he was Secretary of the Middlesex South District of the Massachusetts Medical Society. Perhaps his most important contribution to medical progress came through his work in connection with the Cambridge Court. He served as Probation Officer for many years and advised the Judges and Court Officers of the Third District Court of Middlesex County in regard to the best disposition of delinquent offenders. By this work he greatly aided the Courts and helped them to realize the importance of psychiatric examination prior to the administration of criminal law. Dr. Cady died of pulmonary tuberculosis on November 12, 1925, at the United States Veterans' Hospital No. 89, at Rutland, Mass.

Be It Therefore Resolved that it is with the sincerest regret that the members of this Society sustain the loss of so useful an associate, and

Be It Further Resolved that copies of this resolution be sent to his family and to the Boston Medical and Surgical Journal.

A. Warren Stearns,
Henry R. Viets,
For the Society.

RESOLUTIONS ON THE DEATH OF HENRY RUST STEDMAN, M.D.

Whereas: By the death of Dr. Henry R. Stedman on the 19th of February, 1926, (one of its original members) this Society has sustained a loss of one who was keenly interested in its advancement and influence, and

Whereas: Dr. Stedman by his intelligent and effective efforts toward the institution of State care of the sufferers from mental diseases and epilepsy, and by his service in simplification and codification of our laws governing the care of the mentally afflicted, rendered a service to humanity and to the Commonwealth, and

Whereas: Dr. Stedman's interest in the ad-

vancement of psychiatry as shown by his work for prevention and early treatment of mental disease did not cease as long as good health remained to him; be it

Resolved: That the Boston Society of Psychiatry and Neurology hereby expresses its full appreciation of Dr. Stedman's life work, and be it further

Resolved: That this resolution be entered on the minutes of the Society, and that a copy be transmitted to Dr. Stedman's family, and a second copy to the BOSTON MEDICAL AND SURGICAL JOURNAL.

E. W. TAYLOR,
GEORGE H. TORNEY,
DONALD J. MACPHERSON.

CORRESPONDENCE

THE NATIONAL COMMITTEE FOR MENTAL HYGIENE

May 15, 1926.

Editor, Boston Medical and Surgical Journal:

In the April 15 issue of your JOURNAL there appears on page 696 a very interesting editorial with reference to the National Committee for Mental Hygiene and the field of mental hygiene. In the last paragraph, however, I find: "The Associate Membership fee is $500, which covers the receipt of the *Quarterly Journal of Mental Hygiene.*" This, however, should be $5.00 a year, not $500, though we should, of course, very much like to have $500 from each of our members. In addition, the associate membership dues of $5.00 yearly carry with them complimentary subscriptions to our quarterly magazine and our monthly bulletin as well.

I call the above to your attention, thinking you may wish to correct the inadvertent reference should you have any inquiries.

Very truly yours,
HORTENSE O. PAYNE,
(MRS.) H. O. PAYNE,
Membership Secretary.

POISONING BY ARSENATE OF LEAD ON FRUIT

City of Boston
Health Department
City Hall Annex

Boston, Mass., May 13, 1926.

Editor, Boston Medical and Surgical Journal:

Your editorial reference in the JOURNAL of April 29 to the campaign in England against apples sprayed with arsenate of lead reminds the writer of an official experience during a period several years ago when he was acting Health Commissioner of Boston.

A Health Department food inspector found one evening exposed for sale on a push cart pears speckled with arsenate of lead, from one of which 1/8 grain of arsenious oxide was recovered in the laboratory.

The pears were traced to a California shipment of several carloads. Sample crates taken from the cars showed many pears in each crate as badly speckled as those taken from the push cart. The recovery of from 1/32 to 1/200 grain of arsenious oxide per pear was, however, more frequent.

As an answer to an appeal to the Federal government to stop the interstate shipment of pears obviously contaminated with arsenate of lead the Fruit Growers' Association showed a United States Government Bureau of Entomology circular recommending the spraying of fruit trees two weeks before picking the fruit to protect it against the "coddling moth."

With the singleness of purpose which scientists sometimes exhibit, the fact that fruit was grown to be eaten had been ignored.

The action of the Boston Health Department in condemning and destroying several carloads of pears under the authority of Section 186 of Chapter 94 of the State laws did, however, result in the diversion of contaminated fruit to other markets. So far as the writer recalls, no effective official obstacle was placed in the way of its sale except in Boston, even though the action of the Boston officials was given considerable publicity.

Presumably, as a result of this publicity, a woman in Worcester reported a stomach ache which she attributed to eating pears, but otherwise the public generally throughout the country did not appear to have suffered any appreciable ill effects from taking lead and arsenic with their fruit.

The Boston Health Department co-operated with the shippers and consignees in efforts to salvage some subsequent consignments of fruit. It was found that the arsenate of lead could not be rubbed off or washed off the pears, or dissolved by any chemical solutions which the Department's laboratory chemists could suggest, even to an extent sufficient to reduce the arsenic to a point where it could be called negligible.

It became evident that arsenate of lead owed its popularity to these very adhesive qualities which prevent it from being washed off trees after it is dry.

One carload of condemned pears was canned after subjecting the pears to a washing and paring process which all concerned agreed to be well calculated to remove arsenate of lead, but the contents of the cans still showed traces of arsenic.

The Boston Health Department did not have to show it to be probable that a person would eat enough of the pears to cause a fatal poisoning. It was regarded as possible, however, that children who would be most likely to eat pears without peeling them might conceivably eat enough in the course of a day to develop symptoms of arsenical poisoning.

The danger from the present promiscuous use of arsenate of lead and other poisonous compounds as insecticides is real. Fatal poisonings in animals are very common. The chief danger to human beings seems to be from accidentally sprayed garden truck which is ordinarily eaten uncooked or unpeeled, and, in view of the frequency with which this occurs, it seems quite probable that an acute gastro-enteritis due to arsenical poisoning may often be attributed to other causes.

M. VICTOR SAFFORD.

BLOOD TRANSFUSION

Editor, Boston Medical and Surgical Journal:

A recent news item in the *Boston Post* under date of March 2, 1926, headed, "Drafted to Give a Pint of Blood, Refused $25.00," and further stating, "The record stated that the private was 'Not a volunteer for this service,'" and that "it was impracticable to get volunteers." So the hospital authorities drafted him for this service and then requested permission to pay him $25.00, which they told the Controller-General was the minimum fee customarily paid in hospitals to "donors" of a pint of blood,—calls to the mind of the writer previous incidents which show the abuse of requesting donations of blood for transfusions.

1. In 1915, the writer had occasion to have reported to him an incident occurring in a large hospital. A surgeon desired to demonstrate his method of transfusion to a military commission, the technical process to be recorded by moving pictures. A patient was obtained for the transfusion. However, as there was

a question whether the patient really required the transfusion and no volunteer came forward, nor was any fee offered for a public donor, a house officer was despatched to find among the male nurses one who would volunteer, and at last one was found.

Later the writer was asked by the male nurses of this hospital for his opinion; as to whether nurses should submit to these requests. Bearing in mind altruism and the desire to save the human life is most commendable at all times,—yet considering the facts of this particular incident, it was the opinion of the writer that this procedure was unwarranted. Nurses because of the nature of their occupation are prone to infection and disease, and it may be that an occasional loss of blood may not seriously lower the resistance of the nurse, yet it is the writer's opinion nurses should not be called upon for transfusion.

2. In 1920, the writer again came across an incident in transfusion. A medical student pressed for money to meet his expenses had registered himself in a pathology laboratory as a donor,—his blood was typed and he was on call for donations when required. The writer, then a senior medical student, happened to be observing an operation in the hospital, and, glancing to the corner of the operating room, saw this medical student. He had just submitted to a transfusion of blood and the patient transfused had been returned to the ward. Later in the same year the same student collapsed in a fraternity house and the writer, then the Presiding Senior of the house, on inquiring into the circumstances of the collapse was amazed to learn that the student had just given his third pint of blood for transfusion and the total sum of $75.00 obtained had been applied to his tuition.

Needless to say the physical condition of the student was such that he could not keep up his studies and he eventually left medical school. The writer within a month has seen the same student, who is now a successful and promising movie actor, and wonders what would have been the result had he continued as a medical student and continually given blood. No doubt he would himself have become a recipient for transfusion.

3. In 1924, a medical student employed during the summer months in an industrial plant, where the writer is an assistant surgeon, was called upon for the donation of some blood. He was registered at the hospital of his medical school as a donor. Later inquiring into the circumstances, the writer was again amazed to know the number of times this student had given his blood for transfusion within a period of one year. This student was registered in a medical school distinct from the student of the previous incident.

The article in the *Boston Post* has reference to the compulsory drafting of an enlisted man in the armed service of the United States. No provision was made by regulations of our armed forces for this service. The medical officers doing the transfusion, if they knew the regulations of his service did not permit recompense, despite the ruling of Controller-General McCarl, should not permit this to become a closed incident. Should medical officers in any branch of the armed services be permitted on this precedent to draft enlisted men for such service? Can they not do the same in case of skin graft or a bone graft, and what redress would the enlisted men have under the circumstances?

I have addressed this letter to the BOSTON MEDICAL AND SURGICAL JOURNAL inasmuch as I believe the public press can scarcely correct what to the public mind gives occasion for criticism of our profession. Such incidents as related in the *Boston Post* require attention and correction, and the incidents I have mentioned also require some study and an ethical policy to be established.

It so happens that as a senior medical student my thesis was "Blood Transfusion." I enjoyed reading in the Medical Library and elsewhere literature on blood transfusions,—reference was made to the methods of typing and registering donors, etc.,—I recall no reference to abuses of the system. Somehow I feel there should be some check-up of the systems at present in operation.

Public donors should not be permitted to donate too frequently; some of these donors may give their services in more than one hospital; and "a clearing house" with a list of donors registered in the various hospitals and laboratories might be obtained and in this way a check-up made of the donors, and if the system was further checked by reports of the hospitals and laboratories of the number of donations of blood given by the various donors, it would obviate too frequent gifts of blood and permit, perhaps, a check-up on the physical condition of donors after they had submitted to transfusions. The question of whether nurses and medical students should register as donors would also require study and correction of possible abuses of such services. The matter of transfusion in the armed services of the United States should be definitely covered by a regulation in order to obviate the criticism arising from such a situation as that published in the *Boston Post*.

The time is opportune for a study of methods of giving blood for transfusions, and it is my impression corrections should come from the medical profession, which can best remedy the situation.

Yours very truly,

DAVID H. GIBSON, M.D.

NOTES FROM THE NATIONAL CAPITAL

(From Our Washington Correspondent)

MAKING MORE RIGID THE FEDERAL NARCOTIC LAW

There was introduced in the Senate on April 24 a bill (S. 4085) of considerable significance to physicians, for its alleged purpose is to strengthen the Harrison Narcotic Act. This measure, introduced by Senator Smoot on behalf of the Treasury Department, would amend the existing law drastically and make the prescribing of narcotics much more difficult than at present. The bill provides that: (1) No drug addict may register under the Act; (2) any person convicted of a violation shall not be granted registration for one year from the first of July following such conviction; (3) the absence of appropriate tax paid stamps shall be prima facie evidence of violation; (4) ambulatory treatment prescriptions are prohibited; (5) records, except in emergency cases, must be kept for a period of two years following distribution of all drugs; (6) drugs may not be sold or dispensed "under circumstances from which the dealer might reasonably deduce that the prescription was not issued by the physician, dentist, or veterinary surgeon in the course of his professional practice only"; (7) records must be kept by manufacturers and vendors in such manner as the Commissioner of Internal Revenue shall direct. The purpose of the bill is said to be to get around certain judicial interpretations of the law which have been disadvantageous to the government. The question has been raised by students of legal medicine, however, as to whether the proposed legislation does not exceed the legitimate scope of the Harrison Act, which is based primarily on the revenue-raising power of Congress. The bill has been referred to the Committee on Finance of the Senate.

BOSTONIANS DISCUSS VIVISECTION

Among the witnesses at the hearings on Senator Fletcher's bill (S. 2957) to prohibit experiments on living dogs in the District of Columbia and the territories, held by the District Committee for several

day early in May, were Mr. John Codman of Boston, who supported the measure, and Dr. Reid Hunt of the Harvard Medical School, who opposed it. Medical science was, as usual, denounced by the proponents of this legislation and defended by various eminent scientists. The committee has not made a report up to the middle of May.

OTHER BILLS IN CONGRESS OF INTEREST TO PHYSICIANS

A medical corps, a medical reserve corps, and a nurse corps would be created in the United States Veterans' Bureau, according to the terms of a proposed amendment to the World War Veterans Act, which was reported favorably to the House some time ago. Physicians in the Veterans' Bureau have been endeavoring for several years, with the approval of the Director, to secure a medical service similar to that in the Army, Navy, and Public Health Service.

The Medical Council of the Veterans' Bureau, of which several Massachusetts physicians are members, held a meeting the middle of April. Two hundred hospital dietitians of the Bureau held a conference early in May.

The existence of three different societies of osteopaths in the District of Columbia was revealed at preliminary hearings on a bill to regulate the practice of osteopathy, held on May 4 by the commissioners of the District of Columbia. Each group had different views as to the merits of the bill, but the District Medical Society was united in opposition to the measure.

The importation of milk and cream into the United States would be prohibited unless the shipper held a permit from the Department of Agriculture, according to S. 4126 and H. R. 11768, introduced in Congress at the end of April. The purpose of these bills is to protect public health and they set forth the sanitary requirements of the milk before a permit could be issued.

A new Department of Education with a Secretary in the Cabinet seems to be definitely shelved by the action of the Committee on Education of the House in reporting adversely on May 4 on such a department, and of a similar committee of the Senate in offering a substitute measure, which merely provides for continuation of the present Bureau of Education in the Department of the Interior.

A MODEL SCHOOL HYGIENE BILL

A bill to establish a bureau of school hygiene in the Health Department of the District of Columbia has been introduced in Congress as S. 4051 and H. R. 11836. This measure could well serve as a model for similar legislation applicable to municipalities generally, as it was drafted in admirable fashion by experts in public health and legislation. After setting forth the scope of the proposed bureau, the bill provides for scientific personnel in definite ratio to the school population. Thus, there would be a chief of the bureau, and one part time medical inspector for each 3200 pupils; a supervising nurse, and one full time nurse for each 2000 pupils; one part time dentist for each 9000 pupils; and one full time dental hygienist for each 6000 pupils. This bill has received much favorable newspaper comment in Washington.

SUPREME COURT UPHOLDS REVOCATION OF PHYSICIAN'S LICENSE

The United States Supreme Court recently affirmed a decision of the Supreme Court of Missouri upholding the revocation of a physician's license by the Board of Health of that State (State ex rel Hurwitz v. North et al.). The license of this physician was revoked because he had performed an illegal operation. The United States Supreme Court held that no constitutional right of the physician had been violated by this action and that the construction of the Missouri court of the law of its own State and its action thereon must be sustained. The Supreme Court has in past years upheld medical practice laws of the States on several occasions.

MISCELLANEOUS ITEMS

State and Territorial health officers have their annual conference with the Surgeon-General of the Public Health Service on May 24 and 25. At this meeting, at which Massachusetts will be represented by Dr. George H. Bigelow, such problems as the control of rabies, leprosy, ethyl gasoline, and shellfish will be considered.

The National Board of Medical Examiners met in Washington on May 8. It was announced that 37 States and Territories now recognize the diplomas of this board, while nine other States plan to recognize the examinations of the board, which is an unofficial body, as soon as certain legal technicalities can be removed.

The United States Public Health Service reports that measles has been epidemic throughout the country this year and that there is vastly more pneumonia and influenza than during the past few years.

Three members of an advisory committee of the United States Women's Bureau, which is engaged in a study of women in industry, including their physical condition, have resigned. Included are Mrs. Maud Wood Park of Boston and Mrs. Sara Conboy, formerly of Boston. The members withdrew on account of the alleged tactics of representatives of the National Women's Party in attempting to use the bureau for its own ends.

CONNECTICUT DEPARTMENT OF HEALTH

MORBIDITY REPORT FOR THE WEEK ENDING MAY 17, 1926

Measles	522	Chickenpox	63
Last week	711	Dysentery (bac.)	1
Scarlet fever	95	Encephalitis, epidemic	1
Last week	78	German measles	43
Diphtheria	16	Influenza	12
Last week	25	Mumps	9
Diphtheria bacilli carriers	3	Pneumonia, lobar	49
Whooping cough	54	Tuberculosis, pulmonary	31
Last week	55	Gonorrhea	14
Bronchopneumonia	49	Syphilis	26
Cerebrospinal meningitis	1		

MASSACHUSETTS DEPARTMENT OF PUBLIC HEALTH

DISEASES REPORTED FOR THE WEEKS ENDING MAY 8 AND 15, 1926

	May 8	May 15
Actinomycosis	1	—
Anterior poliomyelitis	1	1
Anthrax	—	1
Chickenpox	81	86
Diphtheria	58	50
Dog-bite	11	19
Encephalitis lethargica	3	3
Epidemic cerebrospinal meningitis	3	3
German measles	509	331
Gonorrhea	94	88
Influenza	35	17
Measles	831	732
Mumps	134	147
Ophthalmia neonatorum	42	16
Pneumonia, lobar	140	138
Scarlet fever	197	221
Septic sore throat	—	1
Suppurative conjunctivitis	5	15
Syphilis	30	51
Trachoma	1	1

Tuberculosis, pulmonary	142	114
Tuberculosis, other forms	16	29
Tuberculosis, hilum	9	56
Typhoid fever	8	8
Whooping cough	278	290
Hookworm	—	1

NOTICE

THRIVING SUBURBAN COMMUNITY WANTS RESIDENT PHYSICIAN

THE undersigned is pastor of a Community Church in a single-residence section of Medford. We have about 4500 people in our district at this time and are rapidly increasing in number. There is no resident physician here. We have a small business section in the center of the community. There is an excellent building just being completed which will provide splendid quarters for a family and two rooms for office and examination room at a cost of only $50 a month. I might add that a ten-cent fare and thirty-five minutes will put one in the heart of Boston from our community.

Address:

JOHN SHADE FRANKLIN,
636 Fulton, Medford, Mass.

REPORTS AND NOTICES OF MEETINGS

ANNUAL CONFERENCE ON MATERNAL AND INFANT HYGIENE

THE Division of Hygiene of the Massachusetts Department of Public Health, in co-operation with the Worcester County Branch of the Massachusetts Association of Directors of Public Health Nursing Associations will hold the Annual Conference on Maternal and Infant Hygiene at Worcester, May 28, 1926.

The program follows:

DEPARTMENT OF PUBLIC HEALTH

Denholm-McKay's Rest Room, 484 Main Street

Lela M. Cheney, R.N., Presiding

10:30 A. M.—*Supervision of the Well Baby*—Miss Sally Pew, R.N., Boston. Discussion—Rural: Miss Marion Woodbury, R.N., Great Barrington. Urban: Miss Edith Bemis, Worcester.

Breast Feeding—Eli Romberg, M.D., Assistant in Pediatrics, Harvard Medical School.

Northbridge Demonstration—Miss Sarah McGaig, R.N.

12:30 P. M.—Adjournment.

DIRECTORS OF NURSING ASSOCIATIONS

Wetherell House, 2 State St., Worcester

10:30 A.M.—*Business Meeting.* Discussion—Shall an Association adopt the policy of not permitting the nurse to testify in court proceeding unless summoned? Responsibility of nursing beyond the town line. What would you consider adequate sick leave? How much clerical work should your nurse do?

JOINT SESSION

Wetherell House, 2 State Street

Mrs, Homer Gage, Presiding

2:00 P. M.—*Round Table: Standards For Prenatal Nursing Service in a Community.*

Report of Committee—Susan M. Coffin, M.D., State Department of Public Health.

Discussion by Miss Marion Woodbury, R.N., Great Barrington, and Joseph W. O'Connor, M.D., Worcester.

Report of Health Congress Atlantic City—Miss Willarette Sears, Fitchburg.

3:45 P. M.—Adjournment.

THE ANNUAL MEETING OF THE WORCESTER DISTRICT MEDICAL SOCIETY

THIS meeting was held at the Country Club in Worcester, May 12, where a large proportion of the members of this Society met. The list of officers elected for the ensuing year is as follows:

President—Dr. Edward H. Trowbridge, Worcester.

Vice-President—Dr. Frank H. Washburn, Holden.

Treasurer—Dr. George O. Ward, Worcester.

Secretary—Dr. Charles A. Sparrow, Worcester.

Orator—Dr. Albert M. Shattuck, Worcester.

Councillor on Nominations—Dr. David Harrower, Worcester; Dr. George O. Ward, Worcester—Alternate.

Committee on Funds—Dr. Kendall Emerson, Worcester; Dr. David Harrower, Worcester; Dr. Ray W. Greene, Worcester.

Commissioner of Trials—Dr. Walter P. Bowers, Clinton.

Councillors—*Dr. Walter P. Bowers, Clinton, Term began 1902; *Dr. Samuel B. Woodward, Worcester, 1902; Dr. Frederick H. Baker, Worcester, 1914; Dr. Leslie R. Bragg, Webster, 1922; Dr. William J. Delahanty, Worcester, 1913; Dr. George A. Dix, Worcester, 1921; Dr. George E. Emery, Worcester, 1920; Dr. Michael F. Fallon, Worcester, 1916; Dr. Homer Gage, Worcester, 1906; Dr. James J. Goodwin, Clinton, 1921; Dr. Ray W. Greene, Worcester, †1907; Dr. David Harrower, Worcester, 1905; Dr. Ernest L. Hunt, Worcester, 1918; Dr. Albert G. Hurd, Millbury, 1916; Dr. Arthur W. Marsh, Worcester, 1922; Dr. Lester C. Miller, Worcester, 1921; ‡Dr. Edward H. Trowbridge,

*Councillors for life by virtue of being Past Presidents of the State Society.
†Continuous except 1915-1916.
‡President of the District Medical Society and Councillor by virtue of office.

Worcester, 1924; Dr. George O. Ward, Worcester, 1915; Dr. Frank H. Washburn, Holden, 1916.

Censors—Dr. Lester C. Miller, Worcester, Supervisor; Dr. Lawrence T. Newhall, Brookfield; Dr. John J. Cummings, Worcester; Dr. Mary A. Charteris, Worcester; Dr. Roger W. Schofield, Worcester.

Nominating Committee—Dr. Charles R. Abbott, Clinton; Dr. Winifred M. Grant, Worcester; Dr. Edward B. Bigelow, Worcester; Dr. John W. O'Meara, Worcester; Dr. Joseph W. O'Connor, Worcester.

Library Committee—Dr. William F. Lynch, Worcester; Dr. Oliver H. Stansfield, Worcester; Dr. William F. Holzer, Worcester.

Librarian—Dr. Albert C. Getchell, Worcester.

Auditing Committee—Dr. Joel M. Melick, Worcester; Dr. Ralph S. Perkins, Worcester; Dr. Ethel M. Rockwood, Worcester.

After the dinner Dr. F. H. Washburn of Holden delivered the annual oration in which the speaker gave interesting reference to the early history of medical practice in Worcester County and discussed some of the questions which are being dealt with at the present time. He felt that the problems incident to the needs of rural districts could be best met by community hospitals. This feeling may have been strengthened by the very successful demonstration made by the hospital in Holden which has been developed to a large degree by Dr. Washburn. The members expressed hearty approval of the oration.

Dr. James S. Stone gave an account of the activities of the State Society, discussing the purposes and methods adopted by the officers. His address was made especially interesting by the use of apt illustrations as well as the orderly sequence of his remarks and the convincing manner of presentation.

The incoming president, Dr. Trowbridge, was introduced by Dr. Watkins and upon assuming the control of the society delivered a short address.

JOINT CONFERENCE ON MATERNAL AND INFANT HYGIENE

THE State Department of Public Health, with Berkshire County Group, Massachusetts Association of Directors of Public Health Nursing Organizations, will hold a Joint Conference on Maternal and Infant Hygiene at the Business and Professional Women's Club, 8 Bank Row, Pittsfield, on June 1, 1926.

MORNING SESSION

Presiding: Merrill Champion, M.D.

10:30—"Coördination of Nursing Activities," Miss Marjorie Stimson, Red Cross.

Report of Committee on Standards of Prenatal Nursing Service (Nursing Aspects). Discussion by Miss Mary E. Ayer, State Department of Public Health; Miss Marion C. Woodbury, Great Barrington; Miss Weaver, Pittsfield; Miss Margaret Young, Adams.

AFTERNOON SESSION

Presiding: Mrs. John L. Robbins.

2:00—Report of Committee on Standards of Prenatal Nursing Service (Community Aspects), Merrill Champion, M.D., State Department of Public Health.

"Medical Prenatal Standards," George M. Shipton, M.D., Pittsfield.

"What Can We Do for the Preschool Child?" Eli C. Romberg, M.D., Boston.

MEETING OF THE HARVARD MEDICAL SOCIETY

THE Harvard Medical Society held its regular meeting at the Peter Bent Brigham Hospital on Tuesday evening, April 13th.

Dr. Cushing presented a neurological case. This case was a man, aged 41, who entered the hospital first in October, 1925, complaining of headaches, awkwardness in the right arm and leg, and hesitancy of speech of a year's duration. A presumptive diagnosis of brain tumor had been made by X-ray before entry. The X-ray taken in the hospital was interpreted as showing a cholesteatoma, although the shadow was quite dark and extended over most of the left half of the cranial chamber. At operation a large cavity containing air was found in the left hemisphere. This was emptied of air and the patient recovered with freedom from symptoms. He felt well until January when there was a gradual return of the symptoms. X-rays showed a reaccumulation of the air in the same region as before. A small bony projection on the ethmoidal region was noted in the X-ray. At the second operation, this area was investigated and a small osteoma was found projecting through the dura into the brain substance and on one edge of it a very small perforation leading from the ethmoid cells directly into the brain. The patient had apparently forced air through this small opening into the brain by blowing his nose. The perforation was closed by sewing a piece of fascia over it.

The second case presented was a woman, aged fifty, who entered the hospital a few days ago in a semicomatose condition, complaining of occipital headache. She had a history of occasional slight mental upset, but had been as well as usual until the morning of the day she came to the hospital, when she felt nauseated and dizzy and became increasingly drowsy. On examination, her pupils were contracted and irregular and there was resistance to passive

movements of her neck and limbs. Babinski's sign was positive on the right side and there was also on this side, a suggestive Kernig's sign. The eye grounds were hazy, but there was no definite choking of the disc. Lumbar puncture showed a bloody spinal fluid with a count of 300,000 red blood cells, but with no increased tension. Her temperature was normal and respirations 30 per minute dropping to normal the next day. The severe headache continued and the spinal fluid was bloody on repeated lumbar punctures. The temperature rose to 103°F on the third day and on the fourth day when the case was demonstrated, there was definite rigidity of the neck and a temperature of 102°F. The diagnosis on entry was cerebral hemorrhage with a question of syphilis of the Central Nervous System. The blood Wasserman and spinal fluid Wasserman were negative. X-rays of the skull were suggestive of early Paget's disease. The possibility of a cerebral aneurysm with rupture and sub arachnoidal hemorrhage was discussed, but no definite diagnosis was made.

Dr. Herrmann L. Blumgart addressed the meeting on some recent work which he and his co-workers, Mr. Yens and Dr. Weiss have been doing on the measurement of the velocity of blood flow. Dr. Blumgart pointed out that there has been no method of clinical value as yet devised for measuring velocity in the vascular system. If a satisfactory method could be found, it would be valuable as a means of measuring the efficiency of the heart and would also give more exact data as to the benefit derived from different drugs in cardiac treatment.

Several attempts have been made to find a satisfactory method. One of the most promising, was elaborated in Germany in 1922. This involved the use of a dye which was injected into the vein of one arm and the time measured which elapsed before it could be detected in the vein of the opposite arm. The method is open to several objections, the chief of which are the danger of dilution of the dye so that it escapes notice, and the fact that the peripheral circulation rate in the arm varies widely within normal limits.

Instead of the dye Dr. Blumgart uses one of the decomposition products of radium, called radium C. This substance has been shown to be absolutely nontoxic even in large doses. In all his studies, first on animals and then on patients, he did careful blood and urine tests, but found no sign of renal irritation.

Only very small doses of the radium C have to be used, one to three millicuries being sufficient for the test. It is injected into the vein of one arm and its arrival in the opposite arm is registered in a detecting device placed on the arm. The velocity time as determined by this method is five to ten seconds shorter than that found by the fluorescein dye method. This indicates that the radium registers when it enters the artery, rather than when it returns in the vein. Dr. Blumgart made numerous tests with this method on normal individuals and on patients with circulatory disturbances. He was able to check his results on the same patients at different times within one to three seconds. The test is a simple one to perform. Nine or ten determinations can easily be done in a seven hour day. It involves very little discomfort for the patient. Only one injection of a very small amount of sodium chloride solution is necessary for the test.

A large series of normal individuals were tested to obtain a normal standard. The velocity time in these varied from 15 to 21 seconds. Differences in age made no apparent difference in the velocity of the blood flow. The ages of the normal individuals tested ranged from 21 to 78.

In patients with arterio sclerosis, there tended to be a retardation of blood flow according to this method. The velocity time in these cases varied from 17 to 34 seconds.

Patients with signs of decompensation, but with a regular heart rhythm showed a circulation time of 40 to 60 seconds. The signs of congestive failure were most prominent in those most retarded.

In cases with auricular fibrillation the circulation time was markedly prolonged. After restoration of normal rhythm with quinidine, there was a distinct reduction in the circulation time, but it was not reduced to normal limits, showing that the decompensation is not entirely due to abnormal rhythm, but also in part to underlying changes in the heart muscle. Quinidine reduced the circulation time slightly in patients already digitalized.

The test does not in any way indicate the cardiac reserve of an individual, but rather gives an indent of the efficiency of the patient's circulatory system at the time. Thus, with this method, one can follow changes in a patient's circulation from week to week and estimate the effectiveness of any form of cardiac treatment.

A series of cases with emphysema were studied. In all these cases the vital capacity was low, but the circulation time in many instances was within normal limits. It therefore seems unlikely that there is retardation of blood flow through the lungs in all cases of clinical emphysema. Elderly patients with emphysema, however, do show a prolonged circulation time, probably because the heart is beginning to fail under the increased burden.

Dr. Blumgart plans to make further studies of the pulmonary circulation and to collect more complete data on the velocity of blood flow in the various types of circulatory disturbance that he has not yet studied.